CATEGORY 5 - TELECOMMUNICATIONS AND "INFORMATION SECURITY"

Part I. *TELECOMMUNICATIONS*

Notes: *1. The control status of components, "lasers", test and "production" equipment, and "software" therefor which are specially designed for telecommunications equipment or systems is determined in Category 5, Part 1.*

2. "Digital computers", related equipment or "software", when essential for the operation and support of telecommunications equipment described in this Category, are regarded as specially designed components, provided they are the standard models customarily supplied by the manufacturer. This includes operation, administration, maintenance, engineering or billing computer systems.

A. SYSTEMS, EQUIPMENT AND COMPONENTS

5A001 Telecommunications systems, equipment, and components.

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to 5A001.a	NS Column 1
NS applies to 5A001.b, .c, or .d	NS Column 2
AT applies to entire entry	AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

LVS: N/A for 5A001.a and b.5
$5000 for 5A001b.1, b.2, b.3, b.6, and .d
$3000 for 5A001.c
GBS: Yes, except 5A001.a and b.5
CIV: Yes, except 5A001.a, b.3 and b.5

List of Items Controlled

Unit: Equipment in number; cable and fiber in meters/feet, components and accessories in $ value
●*Related Controls*: Telecommunications equipment defined in 5A001.a.1 through 5A001.a.3 for use on board satellites is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121). See also 5A101 and 5A991.
Related Definitions: N/A
Items:

a. Any type of telecommunications equipment having any of the following characteristics, functions or features:

a.1. Specially designed to withstand transitory electronic effects or electromagnetic pulse effects, both arising from a nuclear explosion;

a.2. Specially hardened to withstand gamma, neutron or ion radiation; *or*

a.3. Specially designed to operate outside the temperature range from 218 K (-55° C) to 397 K (124° C).

Note: *5A001.a.3 applies only to electronic equipment.*

Note: *5A001.a.2 and 5A001.a.3 do not apply to equipment on board satellites.*

b. Telecommunication transmission equipment and systems, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:

b.1 Being underwater communications systems having any of the following characteristics:

b.1.a. An acoustic carrier frequency outside the range from 20 kHz to 60 kHz;

b.1.b. Using an electromagnetic carrier frequency below 30 kHz; *or*

b.1.c. Using electronic beam steering techniques;

b.2. Being radio equipment operating in the 1.5 MHz to 87.5 MHz band and having any of the following characteristics:

b.2.a. Incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal; *or*

b.2.b. Having all of the following:

b.2.b.1. Automatically predicting and selecting frequencies and "total digital transfer rates" per channel to optimize the transmission; *and*

b.2.b.2. Incorporating a linear power amplifier configuration having a capability to support multiple signals simultaneously at an output power of 1 kW or more in the frequency range of 1.5 MHz or more but less than 30 MHz, or 250 W or more in the frequency range of 30 MHz or more but not exceeding 87.5 MHz, over an "instantaneous bandwidth" of one octave or more and with an output harmonic and distortion content of better than -80 dB;

b.3. Being radio equipment employing "spread spectrum" techniques, including "frequency hopping" techniques, having any of the following characteristics:

b.3.a. User programmable spreading codes; *or*

b.3.b. A total transmitted bandwidth which is 100 or more times the bandwidth of any one information channel and in excess of 50 kHz;

Note: *5A001.b.3.b does not control radio equipment specially designed for use with civil cellular radio-communications systems.*

Note: *5A001.b.3 does not control equipment operating at an output power of 1.0 Watt or less.*

b.4 Being radio equipment employing "time-modulated ultra-wideband" techniques, having user programmable channelizing or scrambling codes;

b.5. Being digitally controlled radio receivers having all of the following:

b.5.a. More than 1,000 channels;

b.5.b. A "frequency switching time" of less than 1 ms;

b.5.c. Automatic searching or scanning of a part of the electromagnetic spectrum; *and*

b.5.d. Identification of the received signals or the type of transmitter; *or*

Note: *5A001.b.5 does not control radio equipment specially designed for use with civil cellular radio-communications systems.*

b.6. Employing functions of digital "signal processing" to provide voice coding output at rates of less than 2,400 bit/s.

Technical Note: *For variable rate voice coding, 5A001.b.6 applies to the voice coding output of continuous speech.*

c. Optical fiber communication cables, optical fibers and accessories, as follows:

c.1. Optical fibers of more than 500 m in length specified by the manufacturer as being capable of withstanding a proof test tensile stress of 2 x 10^9 N/m^2 or more;

Technical Note: *Proof Test: on-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fiber at a running rate of 2 to 5 m/s while passing between capstans approximately 150 mm in diameter. The ambient temperature is a nominal 293 K (20° C) and relative humidity 40%. Equivalent national standards may be used for executing the proof test.*

c.2. Optical fiber cables and accessories designed for underwater use.

Note: *5A001.c.2 does not control standard civil telecommunication cables and accessories.*

N.B. 1: *For underwater umbilical cables, and connectors thereof, see 8A002.a.3.*

N.B. 2*: For fiber-optic hull penetrators or connectors, see 8A002.c.*

d. "Electronically steerable phased array antennae" operating above 31 GHz.

Note: *5A001.d does not control "electronically steerable phased array antennae" for landing systems with instruments meeting ICAO standards covering microwave landing systems (MLS).*

5A101 Telemetering and telecontrol equipment, including ground equipment, designed or modified for unmanned aerial vehicles or rocket systems (including ballistic missile systems, space launch vehicles, sounding rockets, cruise missile systems, target drones, and reconnaissance drones) capable of a maximum "range" equal to or greater than 300 km.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

NOTE: 5A101 does not control*: 1. Telecontrol equipment specially designed to be used for remote control of recreational model planes, boats or vehicles and having an electric field strength of not more than 200 microvolts per meter at a distance of 500 meters;*

2. Equipment designed or modified for manned aircraft or satellites;

3. Ground based equipment designed or modified for terrestrial or marine applications;

4. Equipment designed for commercial, civil, or safety of life (e.g., data integrity or flight safety) Global Navigation Satellite System services.

NOTE: *Item 5A101 does not include items not designed or modified for unmanned aerial vehicles or rocket systems (including ballistic missile systems, space launch vehicles, sounding rockets, cruise missile systems, target drones, and reconnaissance drones) capable of a maximum "range" equal to or greater than 300km (e.g., telemetry circuit cards limited by design to reception only and designed for use in personal computers).*

5A980 Communications intercepting devices; and parts and accessories therefor.

License Requirements

Reason for Control:

Controls on equipment described in this entry are maintained in accordance with the Omnibus Crime Control and Safe Streets Act of 1968 (Public Law 90-351). A license is required for ALL destinations, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See §742.13 of the EAR for additional information on the scope of this control.)

Note: These items are subject to the United Nations Security Council arms embargo against Rwanda described in §746.8 of the EAR.

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

5A991 Telecommunication equipment, not controlled by 5A001.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
●*Related Controls*: Telecommunication equipment defined in 5A991 for use on board satellites is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121). See also 5E101 and 5E991
Related Definitions: 1) '*Bandwidth of one voice channel*' is data communication equipment designed to operate in one voice channel of 3,100 Hz, as defined in CCITT Recommendation G.151.2) '*Communications channel controller*' is the physical interface

that controls the flow of synchronous or asynchronous digital information. It is an assembly that can be integrated into computer or telecommunications equipment to provide communications access. 3) '*Datagram*' is a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination data terminal equipment without reliance on earlier exchanges between this source and destination data terminal equipment and the transporting network. 4) '*Fast select*' is a facility applicable to virtual calls that allows data terminal equipment to expand the possibility to transmit data in call set-up and clearing 'packets' beyond the basic capabilities of a virtual call. 5) '*Gateway*' is the function, realized by any combination of equipment and "software", to carry out the conversion of conventions for representing, processing or communicating information used on one system into the corresponding, but different conventions used in another system. 6) *'Integrated Services Digital Network*' (ISDN) is a unified end-to-end digital network, in which data originating from all types of communication (e.g., voice, text, data, still and moving pictures) are transmitted from one port (terminal) in the exchange (switch) over one access line to and from the subscriber. 7) '*Packet*' is a group of binary digits including data and call control signals that is switched as a composite whole. The data, call control signals, and possible error control information are arranged in a specified format.

Items:

a. Any type of telecommunications equipment, not controlled by 5A001.a, specially designed to operate outside the temperature range from 219 K (-54 °C) to 397 K (124 °C).

b. Telecommunication transmission equipment and systems, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:

Note: *Telecommunication transmission equipment:*

a. Categorized as follows, or combinations thereof:

1. Radio equipment (e.g., transmitters, receivers and transceivers);

2. Line terminating equipment;

3. Intermediate amplifier equipment;

4. Repeater equipment;

5. Regenerator equipment;

6. Translation encoders (transcoders);

7. Multiplex equipment (statistical mutiplex included);

8. Modulators/demodulators (modems);

9. Transmultiplex equipment (see CCITT Rec. G701);

10. "Stored program controlled" digital crossconnection equipment;

11. 'Gateways' and bridges;

12. "Media access units"; and

b. Designed for use in single or multi-channel communication via any of the following:

1. Wire (line);

2. Coaxial cable;

3. Optical fiber cable;

4. Electromagnetic radiation; or

5. Underwater acoustic wave propagation.

b.1. Employing digital techniques, including digital processing of analog signals, and designed to operate at a "digital transfer rate" at the highest multiplex level exceeding 45 Mbit/s or a "total digital transfer rate" exceeding 90 Mbit/s;

Note: *5A991.b.1 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.*

b.2. Modems using the 'bandwidth of one voice channel' with a "data signaling rate" exceeding 9,600 bits per second;

b.3. Being "stored program controlled" digital cross connect equipment with "digital transfer rate" exceeding 8.5 Mbit/s per port.

b.4. Being equipment containing any of the following:

b.4.a. 'Network access controllers' and their related common medium having a "digital transfer rate" exceeding 33 Mbit/s; *or*

b.4.b. "Communication channel controllers" with a digital output having a "data signaling rate" exceeding 64,000 bit/s per channel;

Note: *If any uncontrolled equipment contains a "network access controller", it cannot have any type of telecommunications interface, except those described in, but not controlled by 5A991.b.4.*

b.5. Employing a "laser" and having any of the following characteristics:

b.5.a. A transmission wavelength exceeding 1,000 nm; *or*

b.5.b. Employing analog techniques and having a bandwidth exceeding 45 MHz;

Note: *5A991.b.5.b does not control commercial TV systems.*

b.5.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);

b.5.d. Employing wavelength division multiplexing techniques; *or*

b.5.e. Performing "optical amplification";

b.6. Radio equipment operating at input or output frequencies exceeding:

b.6.a. 31 GHz for satellite-earth station applications; *or*

b.6.b. 26.5 GHz for other applications;

Note: *5A991.b.6. does not control equipment for civil use when conforming with an International Telecommunications Union (ITU) allocated band between 26.5 GHz and 31 GHz.*

b.7. Being radio equipment employing any of the following:

b.7.a. Quadrature-amplitude-modulation (QAM) techniques above level 4 if the "total digital transfer rate" exceeds 8.5 Mbit/s;

b.7.b. QAM techniques above level 16 if the "total digital transfer rate" is equal to or less than 8.5 Mbit/s; *or*

b.7.c. Other digital modulation techniques and having a "spectral efficiency" exceeding 3 bit/s/Hz;

Notes: *1. 5A991.b.7 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.*

2. 5A991.b.7 does not control radio relay equipment for operation in an ITU allocated band:

a. Having any of the following:

a.1. Not exceeding 960 MHz; or

a.2. With a "total digital transfer rate" not exceeding 8.5 Mbit/s; and

b. Having a "spectral efficiency" not exceeding 4 bit/s/Hz.

b.8. Providing functions of digital "signal processing" as follows:

b.8.a. Voice coding at rates less than 2,400 bit/s;

b.8.b. Employing circuitry that incorporates "user-accessible programmability" of digital "signal processing" circuits exceeding the limits of 4A003.b.

c. "Stored program controlled" switching equipment and related signaling systems, having any of the following characteristics, functions or features, and specially designed components and accessories therefor:

Note: *Statistical multiplexers with digital input and digital output which provide switching are treated as "stored program controlled" switches.*

c.1. "Data (message) switching" equipment or systems designed for "packet-mode operation" and assemblies and components therefor, n.e.s.

c.2. Containing 'Integrated Services Digital Network' (ISDN) functions and having any of the following:

c.2.a. Switch-terminal (e.g., subscriber line) interfaces with a "digital transfer rate" at the highest multiplex level exceeding 192,000 bit/s, including the associated signaling channel (e.g., 2B+D); *or*

c.2.b. The capability that a signaling message received by a switch on a given channel that is related to a communication on another channel may be passed through to another switch.

Note: *5A991.c does not preclude the evaluation and appropriate actions taken by the receiving switch or unrelated user message traffic on a D channel of ISDN.*

c.3. Routing or switching of 'datagram' packets;

c.4. Routing or switching of 'fast select' packets;

Note: *The restrictions in 5A991.c.3 and c.4 do not apply to networks restricted to using only "network access controllers" or to 'network access controllers' themselves.*

c.5. Multi-level priority and pre-emption for circuit switching;

Note: *5A991.c.5 does not control single-level call preemption.*

c.6. Designed for automatic hand-off of cellular radio calls to other cellular switches or automatic connection to a centralized subscriber data base common to more than one switch;

c.7. Containing "stored program controlled" digital cross connect equipment with "digital transfer rate" exceeding 8.5 Mbit/s per port.

c.8. "Common channel signaling" operating in either non-associated or quasi-associated mode of

operation;

c.9. 'Dynamic adaptive routing';

Note: *5A991.c.10 does not control packet switches or routers with ports or lines not exceeding the limits in 5A991.c.10.*

c.10. Being packet switches, circuit switches and routers with ports or lines exceeding any of the following:

c.10.a. A "data signaling rate" of 64,000 bit/s per channel for a 'communications channel controller'; *or*

Note: *5A991.c.10.a does not control multiplex composite links composed only of communication channels not individually controlled by 5A991.b.1.*

c.10.b. A "digital transfer rate" of 33 Mbit/s for a 'network access controller' and related common media;

c.11. "Optical switching";

c.12. Employing "Asynchronous Transfer Mode ("ATM") techniques.

d. Optical fibers and optical fiber cables of more than 50 m in length designed for single mode operation;

e. Centralized network control having all of the following characteristics:

e.1. Receives data from the nodes; *and*

e.2. Process these data in order to provide control of traffic not requiring operator decisions, and thereby performing 'dynamic adaptive routing';

Note: *5A991.e does not preclude control of traffic as a function of predictable statistical traffic conditions.*

f. Phased array antennae, operating above 10.5 GHz, containing active elements and distributed components, and designed to permit electronic control of beam shaping and pointing, except for landing systems with instruments meeting International Civil Aviation Organization (ICAO) standards (microwave landing systems (MLS)).

g. Mobile communications equipment, n.e.s., and assemblies and components therefor; *or*

h. Radio relay communications equipment designed for use at frequencies equal to or exceeding 19.7 GHz and assemblies and components therefor, n.e.s.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

5B001 Telecommunication test, inspection and production equipment, as follows (See List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

LVS: $5000
GBS: Yes

CIV: Yes

List of Items Controlled

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 5B991.
Related Definition: N/A
Items:

a. Equipment and specially designed components or accessories therefor, specially designed for the "development", "production" or "use" of equipment, functions or features controlled by 5A001, 5D001 or 5E001.

***Note**: 5B001.a. does not control optical fiber characterization equipment.*

b. Equipment and specially designed components or accessories therefor, specially designed for the "development" of any of the following telecommunication transmission or switching equipment:

b.1. Equipment employing digital techniques designed to operate at a "total digital transfer rate" exceeding 15 Gbit/s;

***Technical Note**: For switching equipment the "total digital transfer rate" is measured at the highest speed port or line.*

b.2. Equipment employing a "laser" and having any of the following:

b.2.a. A transmission wavelength exceeding 1750 nm;

b.2.b. Performing "optical amplification";

b.2.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques); *or*

b.2.d. Employing analog techniques and having a bandwidth exceeding 2.5 GHz;

***Note:** 5B001.b.2.d. does not include equipment specially designed for the "development" of commercial TV systems.*

b.3. Equipment employing "optical switching";

b.4. Radio equipment employing quadrature-amplitude-modulation (QAM) techniques above level 256; *or*

b.5. Equipment employing "common channel signaling" operating in non-associated mode of operation.

5B991 Telecommunications test equipment, n.e.s.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

LVS: $1,000 for Syria; N/A to Iran
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

C. MATERIALS

5C991 Preforms of glass or of any other material optimized for the manufacture of optical fibers controlled by 5A991.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

5D001 "Software", as described in the List of Items Controlled.

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: Yes, except for "software" controlled by 5D001.a and specially designed for the "development" or "production" of items controlled by 5A001.b.5

TSR: Yes, except for exports and reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "software" controlled by 5D001.a and specially designed for items controlled by 5A001.b.5.

List of Items Controlled

Unit: $ value
Related Controls: See also 5D991
Related Definitions: N/A
Items:

a. "Software" specially designed or modified for the "development", "production" or "use" of equipment, functions or features controlled by 5A001 or 5B001.

b. "Software" specially designed or modified to support "technology" controlled by 5E001.

c. Specific "software" as follows:

c.1. "Software" specially designed or

modified to provide characteristics, functions or features of equipment controlled by 5A001 or 5B001;

c.2. [RESERVED];

c.3. "Software", other than in machine-executable form, specially designed for "dynamic adaptive routing".

d. "Software" specially designed or modified for the "development" of any of the following telecommunication transmission or switching equipment:

d.1. Equipment employing digital techniques, including designed to operate at a "total digital transfer rate" exceeding 15 Gbit/s;

***Technical Note**: For switching equipment the "total digital transfer rate" is measured at the highest speed port or line.*

d.2. Equipment employing a "laser" and having any of the following:

d.2.a. A transmission wavelength exceeding 1750 nm; *or*

d.2.b. Employing analog techniques and having a bandwidth exceeding 2.5 GHz;

***Note**: 5D001.d.2.b. does not control "software" specially designed or modified for the "development" of commercial TV systems.*

d.3. Equipment employing "optical switching"; *or*

d.4. Radio equipment employing quadrature-amplitude-modulation (QAM) techniques above level 256.

5D101 "Software" specially designed or modified for the "use" of items controlled by 5A101.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

5D991 "Software" specially designed or modified for the "development", "production", or "use" of equipment controlled by 5A991 and 5B991.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

5E001 "Technology", (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A

TSR: Yes, except for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "technology" controlled by 5E001.a for the "development" or "production" of the following:

1) Items controlled by 5A001.b.5; or
2) "Software" controlled by 5D001.a that is specially designed for the "development" or "production" of equipment, functions or features controlled by 5A001.b.5.

List of Items Controlled

Unit: $ value
●*Related Controls*: Technology defined in 5E001.b.1, 5E001.b.2, 5E001.b.4, or 5E001.c for use on board satellites is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121). See also 5E101 and 5E991
Related Definitions: N/A
Items:

a. "Technology" according to the General Technology Note for the "development", "production" or "use" (excluding operation) of equipment, functions or features or "software" controlled by 5A001, 5B001 or 5D001.

b. Specific "technologies", as follows:

b.1. "Required" "technology" for the "development" or "production" of telecommunications equipment specially designed to be used on board satellites;

b.2. "Technology" for the "development" or "use" of "laser" communication techniques with the capability of automatically acquiring and tracking signals and maintaining communications through exoatmosphere or sub-surface (water) media;

b.3. "Technology" for the "development" of digital cellular radio base station receiving equipment whose reception capabilities that allow multi-band, multi-channel, multi-mode, multi-coding algorithm or multi-protocol operation can be modified by changes in "software";

b.4. "Technology" for the "development" of

"spread spectrum" techniques, including "frequency hopping" techniques.

c. "Technology" according the General Technology Note for the "development" or "production" of any of the following telecommunication transmission or switching equipment, functions or features:

c.1. Equipment employing digital techniques designed to operate at a "total digital transfer rate" exceeding 15 Gbit/s;

***Technical Note**: For switching equipment the "total digital transfer rate" is measured at the highest speed port or line.*

c.2. Equipment employing a "laser" and having any of the following:

c.2.a. A transmission wavelength exceeding 1750 nm;

c.2.b. Performing "optical amplification" using praseodymium-doped fluoride fiber amplifiers (PDFFA);

c.2.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);

c.2.d. Employing wavelength division multiplexing techniques exceeding 8 optical carriers in a single optical window; *or*

c.2.e. Employing analog techniques and having a bandwidth exceeding 2.5 GHz;

Note: 5E001.c.2.e. does not control "technology" for the "development" or "production" of commercial TV systems.

c.3. Equipment employing "optical switching"; *or*

c.4. Radio equipment having any of the following:

c.4.a. Quadrature-amplitude-modulation (QAM) techniques above level 256; *or*

c.4.b. Operating at input or output frequencies exceeding 31.8 GHz; *or*

Note: 5E001.c.4.b. does not control "technology" for the "development" or "production" of equipment designed or modified for operation in any frequency band which is "allocated by the ITU" for radio-communications services, but not for radio-determination.

c.5. Equipment employing "common channel signaling" operating in non-associated mode of operation.

5E101 "Technology" according to the General Technology Note for the "development", "production" or "use" of equipment or software controlled by 5A101 or 5D101.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A

Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

5E991 "Technology" for the "development", "production" or "use" of equipment controlled by 5A991 or 5B991, or "software" controlled by 5D991, and other "technologies" as follows (see List of Items Controlled).

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: 1) 'Synchronous digital hierarchy' (SDH) is a digital hierarchy providing a means to manage, multiplex, and access various forms of digital traffic using a synchronous transmission format on different types of media. The format is based on the Synchronous Transport Module (STM) that is defined by CCITT Recommendation G.703, G.707, G.708, G.709 and others yet to be published. The first level rate of 'SDH' is 155.52 Mbits/s. 2) 'Synchronous optical network' (SONET) is a network providing a means to manage, multiplex and access various forms of digital traffic using a synchronous transmission format on fiber optics. The format is the North America version of 'SDH' and also uses the Synchronous Transport Module (STM). However, it uses the Synchronous Transport Signal (STS) as the basic transport module with a first level rate of 51.81 Mbits/s. The SONET standards are being integrated into those of 'SDH'.
Items:

a. Specific "technologies" as follows:

a.1. "Technology" for the processing and application of coatings to optical fiber specially designed to make it suitable for underwater use;

a.2. "Technology" for the "development" of equipment employing 'Synchronous Digital Hierarchy' ('SDH') or 'Synchronous Optical Network'('SONET') techniques.

EAR99 Items subject to the EAR that are *not* elsewhere specified in this CCL Category *or* in any other category in the CCL are designated by the number EAR99.