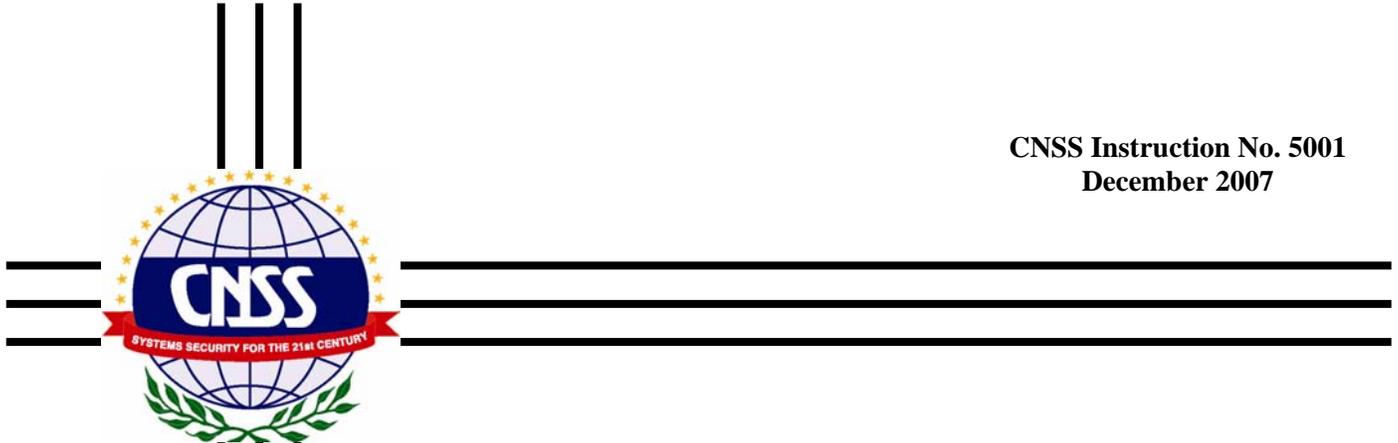


**Committee on National Security Systems**

**CNSS Instruction No. 5001  
December 2007**



**TYPE-ACCEPTANCE PROGRAM  
FOR  
VOICE OVER INTERNET  
PROTOCOL (VoIP) TELEPHONES**

# Committee on National Security Systems

CNSS Instruction No. 5001



## National Manager

### FOREWORD

1. The Committee on National Security Systems Instruction (CNSSI) No. 5001, “Type-Acceptance Program for Voice over Internet Protocol (VoIP) Telephones,” specifies the design, construction, connectivity criteria, acceptance procedures, manufacturer’s testing requirements, and documentation for VoIP type-accepted telephones.

2. The National Telecommunications Security (NTS) Working Group (WG), formerly known as the Telecommunications Security Group (TSG), is the primary technical and policy resource in the U.S. Intelligence Community (IC) for all aspects of the Technical Surveillance Countermeasures (TSCM) Program involving telephone systems located in areas where sensitive government information is discussed.

3. TSG Standards will be replaced by and issued as CNSS Instructions (CNSSIs). Director Central Intelligence Directive (DCID) No. 6/9, reference a, delineated TSG Standards and Information Series compliance by Sensitive Compartmented Information Facilities (SCIFs) for the protection of sensitive information and unclassified telecommunications information processing systems and equipment; SCIF compliance shall now be fulfilled in accordance with the appropriate CNSSIs.

4. CNSS Instruction No. 5001 is effective upon receipt.

5. Copies of this instruction may be obtained by contacting the Secretariat at 410.854.6805 or [www.cnss.gov](http://www.cnss.gov).

6. U.S. Government contractors and vendors shall contact their appropriate government agency or Contracting Officer Representative regarding distribution of this document.

//s//

KEITH B. ALEXANDER  
Lieutenant General, U.S. Army

**TYPE-ACCEPTANCE PROGRAM  
FOR  
VOICE OVER INTERNET PROTOCOL (VoIP) TELEPHONES**

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**SECTION I – PURPOSE**

1. This instruction specifies the design, construction, connectivity criteria, acceptance procedures, manufacturer’s testing requirements, and documentation for VoIP type-accepted telephones for use in any U.S. Government or government contractor sensitive area where national security systems (NSS) are employed and/or within environments where national security information (NSI) is stored, processed, or transmitted. The requirements established in this instruction are intended to ensure that compliant devices cannot pass any audio via VoIP telephones and/or systems located in sensitive discussion areas when they are in an idle state (i.e., not an active call).

**SECTION II – SCOPE**

2. The provisions of this instruction apply to all VoIP Telephony Systems that currently reside, or will reside, in U.S. Government or U.S. Government sponsored contractor spaces where NSS are employed and/or within environments where classified NSI is stored, processed, transmitted, or when used as a point of isolation in accordance with reference b.

3. This instruction shall be referenced and included in U.S. Government-sponsored procurement specifications to define NTSWG VoIP type-accepted telephones.

4. This instruction shall be made available to telephone manufacturers who are supporting U.S. Government contractual requirements for NTSWG VoIP type-accepted telephones.

### **SECTION III – REFERENCES**

5. References are listed in ANNEX A.

### **SECTION IV – DEFINITIONS**

6. Definitions in CNSSI No. 4009, reference c, apply to this policy; additional policy-specific terms are defined in ANNEX B.

### **SECTION V – NTSWG TYPE-ACCEPTANCE PROGRAM**

7. The NTSWG type-acceptance program's objective is to assure the on-hook audio security of all telephone equipment residing in sensitive discussion areas of the U.S. Government or U.S. Government sponsored contractor spaces. The program is dedicated to developing and coordinating the security measures to prevent, detect, and correct on-hook audio anomalies within the telephone equipment.

8. The NTSWG strives to assure that, for any situation, the appropriate authorities of each U.S. Government department or agency will always be able to select and adapt the most appropriate means to effectively and economically obtain the necessary level of security.

9. References b and d through g provide general and specific information applicable to this program.

10. The NTSWG recognizes that not all situations require the same level of security. A measure that is completely proper and sufficient for some applications could be inadequate for other applications; however, the appropriate level of security for any specific application may generally be achieved with a selected combination of several measures. The cumulative effect of properly selected complementary measures (which would have been deficient individually) can be used to produce the desired result. Accordingly, every telephone-related security problem of which NTSWG is made aware is examined in detail so the government may be provided with the greatest possible diversity of approaches for its correction.

11. A viable and important approach for telephone security, which has long been employed by the U.S. Government, is the concept of the type-accepted telephone. This is

a telephone instrument, which by virtue of its design and construction has the following properties:

11.1 The telephone cannot be caused to produce audio when it is in the idle state except by intrusive physical modifications within the telephone set.

11.2 The telephone is not tractable to the implementation of intrusive modifications.

11.3 Electrical and physical inspection can readily determine if an intrusive modification has been placed within the telephone and if the design/construction security measures are operating properly.

11.4 The VoIP telephone communicates with the voice network over a publicly published protocol, or if the protocol is proprietary it must be provided to the NTSWG prior to instrument testing.

12. Reference e specifies the design and construction criteria for the NTSWG type-acceptance of telephones that are compatible with the traditional non-proprietary central office interface of the public switched telephone network (PSTN). A fundamental requirement of the basic NTSWG type-accepted telephone is for all external wirelines entering the telephone be disconnected from all internal circuitry (except the annunciator) when the telephone is in the idle state. VoIP telephones, even when they are in the idle state, need continuous connectivity to a VoIP system in order to exchange information on a regular basis. Therefore, the VoIP system cannot support the requirement for total physical disconnect from the external wirelines. The NTSWG type-acceptance requirements to be applied for telephones using Internet protocol (IP) to carry voice are provided by this instruction vice reference e.

13. Without the use of type-accepted telephones, telephone installations can be considered secure only if the telephones are isolated or disconnected from all unprotected wires, which is achieved by the means of supplementary isolator or disconnect devices placed on the wires or by using a Computerized Telephone System (CTS) specially configured to conform to reference b.

14. On-hook telephone security based on isolation or disconnect methods cannot be universally applied to VoIP telephones as:

14.1 VoIP telephones are not compatible with conventional isolator/disconnect devices that are designed for the normal central office interface. It may be possible to construct a VoIP line isolator that would remove base-band audio from the wires, but such an isolator would not prevent network access to the idle telephone.

14.2 Results of system characteristics or operational constraints, some installations, and some VoIP telephones in particular, physically cannot be made to conform to this instruction. Also, in many cases the cost of applying this instruction is incommensurate with the number of telephones that must be protected. Even though there may only be a few specific telephones in the installation that require on-hook security, the entire system would have to comply with the instruction.

15. The type-acceptance of VoIP telephones that have been demonstrated to incorporate intrinsic on-hook audio security provides a means to assure the security of an installation when isolation/disconnection measures (supplementary devices and/or the existing TSG/NTSWG installation guidelines) are either physically incompatible or economically infeasible.

16. Neither the type-acceptance program nor the application of isolation/disconnection measures method is regarded as being better than the other. They are both equally acceptable alternative methods for obtaining audio security. There will be situations where either the isolation/disconnection approach or the type-accepted telephones will be the preferred method.

17. The following elements of the NTSWG telephone type-acceptance program are essential:

17.1 The design and construction specifications that describe the conditions under which telephones are considered to be:

17.1.1 Physically incapable (by reason of design and construction) of producing microphonic audio on any wires leaving the instrument while it is in the idle state.

17.1.2 Capable of being individually subjected to routine on-site physical and electrical inspections.

17.2 The standardized evaluation and qualification conditions that are used to determine each type-acceptance class.

17.3 The requirements for documentation and sureties to be provided to the requesting U.S. Government department or agency. These must properly demonstrate and guarantee that a particular model telephone does conform to all required criteria. Any telephone model whose design and construction is shown by adequate documentation, backed by the necessary surety, to conform to the required criteria will be type-accepted by the NTSWG and approved for installation and use without any requirement for additional isolation or disconnect measures.

17.4 The type-acceptance application process.

17.5 Limited requirements on product stability. These are applied, for the most part, only to those components of the type-accepted telephone that are used to implement mandatory security features. The manufacturer is largely free to change all non-related areas without affecting its type-acceptance status.

17.6 Labeling requirements for type-accepted telephones.

17.7 Guidelines for use by U.S. Government departments and agencies to enable them to identify and select telephones suitable for use in sensitive discussion areas.

18. Type-acceptance programs are mutually beneficial to the government and to the telephone industry. The NTSWG design and construction criteria for type-acceptance are provided both to U.S. Government departments and agencies and members of the telephone industry. The identification of the type-accepted telephone models allows government departments and agencies (who are concerned about on-hook telephone security) to exclude from consideration for procurement all telephones that are not acceptable. Manufacturers who wish to compete in this market can readily determine if their products are acceptable and, if not, what modifications are necessary to make the telephones acceptable. The type-acceptance procedure clearly defines what portions of the telephone can be subsequently altered by the manufacturer without affecting its type-accepted status. Changes of this sort can be made at the discretion of the manufacturer without involvement of the government.

19. In order that maximum flexibility is provided to produce the most economical, fully effective security program for every individual application, NTSWG has developed criteria for multiple categories of type-accepted electronic telephones.

20. The intent of the NTSWG type-acceptance program is for all telephones to be physically incapable of producing any microphonic audio on any wires leaving the instrument while it is in the idle state.

21. For this instruction, two classes rate the telephone equipment on the basis of idle-state security only. In-use security considerations are of importance in some situations, and manufacturers may wish to indicate special virtues of their products that are applicable to those situations. Class A equipment is not dependent on any other equipment for security. Class B equipment meets the same testing criteria as Class A equipment with the exception of testing in the power off state. The power off test is one of the most difficult for the equipment to pass. Class B equipment must be directly connected to a network switching device collocated within the same sensitive area as the telephone.

**SECTION VI – PROCEDURE FOR OBTAINING AND MAINTAINING NTSWG  
TYPE-ACCEPTANCE**

22. Type-acceptance procedures cannot be applied effectively to any telephone without the full cooperation of the manufacturer. The type-acceptance model involves the manufacturer on a continuing basis, to include, but not be limited to the following:

22.1 Design of the original telephone.

22.2 Design of modifications necessary to comply with the type-acceptance requirements.

22.3 Testing the candidate telephone to establish that it does perform in accordance with the type-acceptance criteria.

22.4 Documentation of all claims relating to the type-acceptance requirements.

22.5 Technical information to support the development of field inspection procedures.

23. When a manufacturer applies for and receives type-acceptance, it is for the specific configuration described in the application documentation. NTSWG assigns a type-acceptance number to the submitted configuration, which cannot be used on any alternative configuration that involves a change to any portion of the telephone designated as a critical subassembly/security feature for the type-acceptance class. The manufacturer's type-acceptance may be revoked, at any time, when evident that the telephone is not providing adequate idle-state audio security.

**INITIAL CONTACT**

24. A manufacturer responding to a specific procurement requirement (whether a direct request or a public announcement) of a U.S. Government department or agency submits the application for type-acceptance to the specific U.S. Government department or agency.

25. A manufacturer wishing to obtain type-acceptance to gain entry into the portion of the government market affected by the type-acceptance program can apply to any participating U.S. Government department or agency.

**PROCEDURE**

26. Sponsor ascertains the type-acceptance class/classes required, if appropriate.

27. NTSWG evaluates the proposed products to determine the degree of compliance with the criteria for the class intended.

28. The vendor develops and implements any modifications necessary to meet the requisite criteria. Documentation of the proposed modifications may be submitted to the U.S. Government department or agency in question for preliminary evaluation before actual implementation. [Preliminary approval of the approach, based on the documentation submitted, means only that no obvious deficiencies are in evidence. Actual type-acceptance requires that the modified telephone be fully tested in accordance with the requirements for the type-acceptance class in question. There is no assurance that an approach that has received preliminary approval will pass these tests.]

29. Vendor submits letter of application, signed by an authorized company official, containing the following:

29.1 Identification of product includes the manufacturer, product line, and models involved and additional descriptive information, as necessary, to eliminate all possibility of ambiguity or confusion with any other product.

29.2 The class for which application is being made.

29.3 Certification that the product meets the criteria for that class, and that it may be opened for visual and electrical inspection (to verify that it conforms to all type-acceptance criteria) at any time without invalidating the normal product warranties.

*Note: This requirement does not apply to Type 1 encryption equipment.*

29.4 Point of contact for inquiries must include: name, title, address, telephone number, and email.

30. Vendor submits summary of product offering, including manufacturer's sales and/or technical literature for the product.

31. Vendor submits their own summary of test results, explaining basis for asserting that the proposed telephone meets the appropriate type-acceptance criteria.

32. Vendor submits functional description, containing the following:

32.1 Operation of telephone.

32.2 Appearance.

32.3 Installation requirements.

32.4 Operations manual.

32.5 Identification of all systems with which the telephone is compatible.

32.6 Features, options, and auxiliary units available with the version being evaluated. Options available on the standard commercial model may, at the manufacturer's discretion, be excluded from the version being submitted for type-acceptance.

33. Vendor submits electrical description, containing the following:

33.1 Theory of operation, including description of connection to VoIP system and any other external connections.

33.2 Block diagrams, including complete descriptions of signals between functional blocks.

33.3 Schematic diagrams and circuit descriptions.

33.4 Components listing.

33.5 Installation and maintenance manual(s).

34. Vendor submits detailed security evaluation that includes all features, options, and auxiliary units included in paragraph 32.6. All applicable criteria are applied to the basic telephone and to the composite formed when the auxiliary units are attached and operational, that includes:

34.1 Providing component layout diagrams, including location and function of test points.

34.2 Providing circuit descriptions and diagrams of all audio circuits, focal subassemblies, and critical subassemblies.

34.3 Identifying all components (manufacturer and model number) added to implement positive security measures.

34.4 Documenting operational behaviors of software/firmware involved in the implementation of the positive security measures.

34.5 Citing each applicable type-acceptance criterion by its paragraph number in Section VII of this instruction (the paragraph numbers indicate if the criterion being addressed is specific to the class that the application is being requested). Show how the proposed telephone complies with the criterion.

35. NTSWG will coordinate laboratory testing on sample product. The laboratory test report will typically have a limited distribution to U. S. Government personnel and contain the following information:

- 35.1 Abstract.
- 35.2 Objectives of tests.
- 35.3 List of test equipment used.
- 35.4 Test equipment configuration used for each test.
- 35.5 Test data and conclusions.

36. Vendor will provide support documentation for field tests and inspections for distribution to field inspection teams for use during on-site testing. The information provided for this purpose should be non-proprietary to include:

- 36.1 Component layout diagrams, including location and function of any test points.
- 36.2 Instructions for assembly and disassembly of the telephone.
- 36.3 Photographs showing the appearance of all circuit boards and assemblies.

37. Supplementary information may be requested by the U.S. Government in order to complete the U.S. Government evaluation of the application.

### **MARKETING OF TYPE-ACCEPTED TELEPHONES**

38. Telephones being marketed to U.S. Government departments or agencies, as NTSWG type-accepted telephones must be permanently marked with the NTSWG type-acceptance number and either the serial number or the month and year of manufacture. Additionally, if the instrument is speakerphone capable the label must indicate that fact.

39. A NTSWG type-acceptance number assigned to a telephone will be recognized as a type-accepted item by all U.S. Government departments and agencies without need for further evaluation.

## **SECTION VII – DESIGN AND CONSTRUCTION REQUIREMENTS**

### **Preliminary Note**

The general approach and requirements applicable to all type-acceptance classes are presented here.

### **INTRODUCTION**

40. The criteria used to determine qualification for type-acceptance in one of the designated security classes apply to VoIP type-accepted electronic telephones. There are only two classes:

- Class A equipment is not dependant on any other equipment for security.
- Class B equipment meets the same testing criteria as Class A equipment with the exception of testing in the power off state. The power off test is one of the most difficult for the equipment to pass. Class B equipment must be directly connected to a network switching device that is physically located in the secure area and controlled.

41. The telephone must be demonstrably physically incapable of producing any microphonic audio on any wires leaving the instrument while it is not in use.

42. Regardless of the state of the telephone (e.g., in-use, idle, programming...), no change (i.e., temporary or permanent) in any of the security features required for the type-acceptance class can result from any acoustic or electromagnetic signals, or from action by the parent system, or from signals on any of the station mounting cord wires or power supply wires. The security features are independent of the voltages (or absence thereof) on any of the wires.

43. All transducers shall be physically isolated from all external wiring. A visual indicator shall be illuminated at all times when any physical isolation is not active. This visual indicator shall only be controlled through the physical act of either taking the instrument off hook, or activating approved speakerphone function. These controls shall be impervious to firmware or software manipulation.

44. NTSWG has concluded that in most cases the objectives of this program are best achieved by using metallic-contact disconnect devices (switches and relays). It is recognized that the modern telephone industry often regards these devices as obsolete technology. The requirement herein, however, does not derive merely from the functional performance, but from physical and electrical characteristics that make the performance readily confirmable by electrical and physical inspection. It is emphasized, therefore, that whenever the type-acceptance criteria specifically designates metallic-contact disconnect devices, functionally equivalent operational alternatives employing more modern technologies will not be acceptable. The metallic-contact disconnect devices used to isolate and short the various transducers and handset functions may be switches located in the handset mounting that are operated directly by placing and

removing the handset, or they may be relays that are controlled by whatever form of hookswitch is used.

### **OPERATIONAL LIMITATIONS**

45. The telephone must not be capable of cordless operation. Wireline connections between the telephone and the VoIP system are needed for the telephone to function. All communications and information interchange among the telephone, the component parts, auxiliary units, and the VoIP system must be over physical connections.

46. There must not be any hands-free answering capability. A manual action on the part of the user is necessary to initiate, answer, join, or maintain a call. The telephone can be in the in-use state only if:

46.1 The handset is physically removed from the handset mounting, or

46.2 A manual speakerphone switch is activated, or

46.3 An auxiliary unit is manually activated, or

46.4 A type 1 device running in secure data-only mode may have an auto-answer function.

47. Some telephones may require additional action by the user (such as pressing a line select key) to be in the in-use state, which is entirely acceptable.

48. The telephone is immediately restored to and remains in the idle state if:

48.1 All auxiliary units are manually deactivated, and

48.2 All speakerphone switches are turned off, and

48.3 The handset is positioned in the handset mounting.

49. When a call termination is verified, all required idle-state security measures automatically and immediately become effective. When the telephone is in the idle-state the telephone shall be designed to prevent the codec from passing audio electrically outside of the telephone assembly.

50. Security measures that require manual action cannot include any software-dependent or firmware-dependent functions.

51. The hold feature is required for in-use state. When the user activates the hold feature, no audio from the line placed on hold may be transmitted outside of the telephone assembly and handset.

## **TELEPHONE SECURITY INSPECTION SUPPORT MEASURES**

### Electrical Requirements

52. In implementing the design criteria the telephone is to be treated as an ensemble of electrical and electronic subassemblies, some of which contain microphonic components. Evaluation with respect to security principles and the implementation of security measures are then to be confined to those subassemblies (the handset for example) that actually contain the microphonic components rather than to the entire telephone. A microphonic component, by definition, produces electrical signals in response to audio acoustic signals.

53. All means by which signals may be coupled from the internal sub-assemblies to external wires and media are of concern. These include, but are not limited to, direct metallic connections, electric field coupling, magnetic field coupling, electro-optics, powerline modulations, packetized voice, and modulated radio frequency (conducted and/or radiated).

54. The description of the telephone as an ensemble of subassemblies is for convenience in specifying, applying, describing, and evaluating the protective measures. The analysis must allow all audio transducers and their attendant protective measures to be precisely identified and explained. For the most part, this theoretical division of the telephone into subassemblies will follow natural functional divisions inherent in the instrument (such as handset, ringer, or dial), but this need not be the case, and any arbitrary boundaries may be used providing that they do not violate the specific requirements for the intended type-acceptance class.

55. Components or devices included in the instrument as positive security measures must be tested and shown to be non-microphonic. The open-circuit pressure response level must be measured across every pair-wise combination of connections/conductors to the component/device. In the range 200 Hz to 6 kHz, the microphonic response must be less than 1  $\mu$ Vrms for a sound pressure level of 2 Pa.

56. Except for annunciators, the instrument must not include components that receive, process, or in any way act on electrical signals or instructions that originate outside the telephone-auxiliary unit composite except as required for call control signaling/commands and data network connectivity.

57. All transducers except the annunciator are operationally inactive, except when the telephone is in the in-use state. The annunciator transducer is operationally inactive except when an incoming call is being announced.

58. Visual indication is to be provided whenever any of the protective measures other than those for the annunciator are not in effect, such as:

58.1 If the protective measures are disabled because the handset was removed from the handset mounting no further visual indication is necessary.

58.2 If there are ways in which the user can cause the telephone to be in the in-use state without a user lifting the handset, the telephone must be fitted with a visual indicator that will unambiguously show when the protective measures have been disabled. This visual indicator must be hardware based and respond to all activities that disable the protective measures while the handset is in the handset cradle.

### Mechanical Requirements

59. The construction of the telephone set must provide a means for the physical inspection of all security measures to ensure they are functioning properly. Positive security functions must be verifiable by physical inspection and/or electrical measurement.

60. The telephone must be capable of repeated disassembly (up to 10 times) without physical damage or deterioration occurring. Type 1 devices are exempted.

61. All connections and coupling mechanisms (intentional or fortuitous) that cross the boundaries of the focal sub-assemblies must be identified

62. Type-acceptance requires test points (i.e. to perform electrical verification of security protective conditions), the test points must be placed so they can be safely accessed while the telephone is operational. The location of the test points must be such that they can be accessed without danger of touching any other component or wiring. Under no circumstances shall the security-related test points be accessible without the telephone case being opened. Type 1 devices are exempted.

63. All transducers not specifically allowed must be physically removed from the telephone set, not merely disconnected.

64. The construction of the telephone must preclude any possibility that internal components or wiring can obstruct the operation of any switch or device used to provide or control the physical security protective measures.

65. Any use of multiple hookswitch plungers will be fully redundant. Depressing any one alone will fully operate all the idle-state protective measures.

### MANUFACTURING RESTRICTIONS

66. Once a telephone is type-accepted, design or construction changes are permitted unless the changes affect some aspect of the criteria requirements. Any design or construction change in the criteria requirements will automatically cancel the telephone's type-acceptance status.

## **ELECTRICAL TEST REQUIREMENTS FOR CLASS A**

### Sound Pressure Response Tests

67. The pressure response level measurements are to determine if there is excessive coupling of microphonically produced signals from the focal subassemblies to conductors in their vicinity or to the external wires. Acoustic energy is projected at the microphonic element at a specified sound pressure level; ground-referenced and differential voltage measurements are performed at the conductors of interest.

### Acceptance Criteria

68. For sound pressure levels of 2 Pa, the pressure response voltages must not exceed 1  $\mu$ Vrms on any external wiring. All conductors leaving the telephone must be tested.

### Test Conditions

69. The sensitivity of the test instrumentation and the environmental noise conditions, throughout the specified frequency range, must permit the detection and accurate measurement of any signal from a 100,000 ohms (or less) source with an open circuit voltage at least one-tenth the maximum allowed level. The net loading impedance of the test instrumentation must be equal to or greater than 100,000 ohms at the point of connection to the conductors being tested.

70. Online tests are performed in the idle state with the telephone connected to the VoIP system in the normal manner. For the offline tests, the telephone is completely disconnected from the VoIP system. In both cases, all contacts used for positive security measures are in their normal condition (normal-open are open, normal-closed are closed).

### Acoustic Signals

71. The sound pressure levels of the test signals are not less than 2 Pa for all tests. All tests are conducted over the frequency range 200 Hz to 6 kHz either continuously or at intervals not to exceed one-half octave below 400 Hz and one-third octave above 400 Hz. The test frequency may be modulated to facilitate recognition during recovery but the RMS value must not be less than 2 Pa for at least 50 percent of the modulation cycle.

72. Testing of more than one transducer at a time is allowed as long as the sound pressure level at each transducer being considered is at least 2 Pa. In any event every transducer in the telephone-auxiliary unit composite must be tested either in combination with other transducers or in a separate test run.

### External Wiring

73. The external wiring that must be tested consists of the conductors (i.e., wires) in the station mounting cord and in any other external electrical connection to the telephone (not handset, headset, or auxiliary unit cords). Measure the electrical signal produced as the result of pressure response from the 2 Pa sound sources or as specified by reference f. Tests must also be performed to ensure that digitized audio is not present. Both ground-referenced voltages and differential pair-wise voltages must be measured for each of these conductors. Every conductor must be tested individually against ground and in pair-wise combination with every other conductor. The pressure response voltages must not exceed the stipulated 2 Pa limits.

## **ELECTRICAL TEST REQUIREMENTS FOR CLASS B**

### Sound Pressure Response Tests

74. The pressure response level measurements are to determine if there is excessive coupling of microphonically produced signals from the focal subassemblies to conductors in their vicinity or to the external wires. Acoustic energy is projected at the microphonic element at a specified sound pressure level; ground-referenced and differential voltage measurements are performed at the conductors of interest.

### Acceptance Criteria

75. For sound pressure levels of 2 Pa, the pressure response voltages must not exceed 1  $\mu$ Vrms on any external wiring. All conductors leaving the telephone must be tested.

### Test Conditions

76. The sensitivity of the test instrumentation and the environmental noise conditions, throughout the specified frequency range, must permit the detection and accurate measurement of any signal from a 100,000 ohms (or less) source with an open circuit voltage at least one-tenth the maximum allowed level. The net loading impedance of the test instrumentation must be equal to or greater than 100,000 ohms at the point of connection to the conductors being tested.

77. On-line tests are performed in the idle state with the telephone connected to the authenticated VoIP system in the normal manner. Offline tests are not required for Class B devices. All contacts used for positive security measures are in their normal condition (normal-open are open, normal-closed are closed).

### Acoustic Signals

78. The sound pressure levels of the test signals are not less than 2 Pa for all tests. All tests are conducted over the frequency range 200 Hz to 6 kHz either continuously or at intervals not to exceed one-half octave below 400 Hz and one-third octave above 400 Hz. The test frequency may be modulated to facilitate recognition during recovery but the RMS value must not be less than 2 Pa for at least 50 percent of the modulation cycle.

79. Testing of more than one transducer at a time is allowed as long as the sound pressure level at each transducer being considered is at least 2 Pa. In any event every transducer in the telephone-auxiliary unit composite must be tested either in combination with other transducers or in a separate test run.

### External Wiring

80. The external wiring that must be tested consists of the conductors (wires) in the station mounting cord and in any other external electrical connection to the telephone (not handset, headset, or auxiliary unit cords). Measure the electrical signal produced as the result of pressure response from the 2 Pa sound sources or as specified by reference f. Tests must also be performed to ensure that digitized audio is not present. Both ground-referenced voltages and differential pair-wise voltages must be measured for each of these conductors. Every conductor must be tested individually against ground and in pair-wise combination with every other conductor. The pressure response voltages must not exceed the limits stipulated above.

## **SECTION VIII – SUPPLEMENTARY DESIGN AND CONSTRUCTION** **SPECIFICATIONS TYPE-ACCEPTANCE**

### Preliminary Note

The specific supplementary requirements that are applicable for NTSWG type-acceptance are presented here.

### **OPERATIONAL/PHYSICAL LIMITATIONS**

81. When the telephone is in the idle state:

81.1 No audio signals originating outside the telephone can be annunciated directly by any element in the telephone.

81.2 Externally generated incoming ring signals or instructions may only activate a ring signal generator located in the telephone.

81.3 Audible annunciation of an incoming call is accomplished with the internally generated signals that occur when the appropriate incoming ring instruction/signal is received by the telephone.

81.4 When the telephone is in the idle-state, the electronic/conductive path from all audio transducers shall be physically disconnected and the input to the codec shall be blocked or disabled.

82. Incoming audio may be routed to the receiver element in the handset or to a speaker in an auxiliary unit, or in the main body of the telephone set when, and only when, the telephone is in the in-use state. This audio may be either for an existing call, for local intercom, or to annunciate another call.

83. When transitioning from the in-use-state to the idle-state, the codec shall be disabled or shunted within 1 second.

### **SECTION IX – RESPONSIBILITIES**

84. Heads of Federal Departments and Agencies shall:

a. Develop, fund, implement, and manage programs necessary to ensure that the goals of this policy are achieved and that plans, programs, and CNSS issuances that implement this instruction are fully supported.

b. Incorporate the content of this instruction into annual user education, training, and awareness programs.

Encl:

ANNEX A	References
ANNEX B	Definitions
ANNEX C	List of Acronyms

## **ANNEX A**

### **REFERENCES**

- a. Director of Central Intelligence Directive (DCID) No. 6/9, "Physical Security Standards for Sensitive Compartmented Information Facilities," November 2002.
- b. Telephone Security Group (TSG) Standard 2, "TSG Guidelines for Computerized Telephone Systems," Revised September 1993.
- c. CNSS Instruction No. 4009, "National Information Assurance (IA) Glossary," Revised June 2006.
- d. Telephone Security Group (TSG) Standard 1, "Introduction to Telephone Security," March 1990.
- e. Telephone Security Group (TSG) Standard 3, "Type-Acceptance Program for Telephones used with the Conventional Central Office Interface," March 1990.
- f. Telephone Security Group (TSG) Standard 5, "On-Hook Telephone Audio Security Performance Specifications," March 1990.
- g. Telephone Security Group (TSG) Standard 6, "Telephone Security Group Approved Equipment," Update June 2006.

## ANNEX B

### DEFINITIONS

The terms and definitions apply strictly to this instruction and are provided to ensure a precise, unambiguous meaning in describing NTSWG requirements and have no related meaning in any other context. Terms usages are intended to be consistent with most common telephone industry practices however, terms can vary significantly from company to company. This annex is not a definitive source for which these terms may be employed, therefore, it is important in using the NTSWG standards that these terms not be given any more or any less meaning than is specified herein.

- a. **Annunciator:** A device for producing an audible signal to announce an incoming call.
- b. **Audible Signal:** A sound that is specifically emitted by the telephone to be audible anywhere in its immediate vicinity.
- c. **Auxiliary Unit:** A device connected to the telephone by means other than the station mounting cord or the handset cord.
- d. **Built-In Microphone:** A microphone located in the body of the telephone rather than in the handset.
- e. **Cord:** A flexible assembly of individually insulated electrical wires enclosed in a common insulating jacket and fitted with terminating connectors used to provide the electrical connections between two separate, distinct units or component parts.
- f. **Critical Subassembly:** Any subassembly that is not a focal subassembly but that contains components essential to the operation of positive security functions.
- g. **Computerized Telephone System (CTS):** A generic term used to describe any telephone system that uses centralized stored program computer technology to provide switched telephone networking features and services. Referred to commercially by such terms as computerized private branch exchange (CPBX), private branch exchange (PBX), private automatic branch exchange (PABX), electronic private automatic branch exchange (EPABX), computerized branch exchange (CBX), computerized key telephone systems (CKTS), hybrid key systems, business communications systems, and office communications systems. In the case of this instruction the CTS includes the PBX, call manager, or server that administers the voice network and sets up the voice communication, voice gateways that bridge between the IP and the circuit switched PSTN infrastructures,

and IP network switching/routing components that control communication between VoIP telephones.

- h. Disabled: A device, component, or service that is disabled by manual action of the user shall not be re-enabled other than by manual action of the user. No software control can over-ride the result of a manual user action.
- i. Disconnect: A device that [1] inserts a break at some point in the normal hard-wire conduction path that exists between a telephone and its telecommunications medium, and [2] only when the telephone is in the in-use state, establishes a temporary metallic connection across that break.
- j. Focal Subassembly: Any subassembly that contains transducers or other potentially microphonic components.
- k. Hands-Free Answering: A feature available on some telephones and telephone systems that, when certain types of incoming calls occur, either automatically places the telephone in the in-use state or allows the user, without any manual action, to initiate the in-use state by means of a voice-activated switch.
- l. Handset: A combined telephone earpiece (containing a receiver element) and mouthpiece (containing a transmitter element) mounted on a handle.
- m. Handset Cord: A flexible assembly of individually insulated electrical wires enclosed in a common insulating jacket and fitted with terminating connectors: used to provide the electrical connections between the handset and the main body of the telephone.
- n. Handset Mounting: The receptacle, bracket, cradle, or other support specifically provided on the main body of the telephone to hold the handset when it is not in use; the handset mounting is fitted with a means to detect whether or not the handset is in place in (or on) the handset mounting.
- o. Headset: A combined telephone earpiece (containing a receiver element) and mouthpiece (containing a transmitter element) assembly to be worn on the user's head.
- p. Hookswitch: The device employed to determine if the handset is or is not in place in (or on) the handset mounting is termed the hookswitch regardless of how it operates. In some cases the hookswitch will not involve any sort of mechanical switch and/or break any incoming loop current.
- q. House Cabling: The wiring and associated frames that provide the electrical connections between the telephone system and the individual blocks or jacks for each voice terminal station mounting cord.

- r. Idle State (Voice Terminal): A voice terminal is in the idle state whenever it is not in the in-use state (see below). When the telephone is in the idle-state the telephone shall be designed to prevent the codec from passing audio electrically outside of the telephone assembly.
- s. In-Use State (Voice Terminal): A voice terminal is in the in-use state if it is communicating to its network system and is either initiating, terminating or actively engaged in user communications.
- t. Isolator (Isolation): A device that [1] inserts a break at some point in the normal hard-wire conduction path that exists between a telephone and its telecommunications medium, and [2] only when the telephone is in the in-use state, provides a temporary communications channel across that break without establishing an end-to-end metallic connection.
- u. Manual Action: An action that requires that the user touch, move, lift, or otherwise manipulate by hand, some control or part of the telephone. An operation that is actuated by the user's voice does not qualify as a manual action.
- v. Public Switched Telephone Network (PSTN): The ordinary dial-up telephone system.
- w. Push-to-Operate Handset: There are three forms of push-to-operate handsets.
  - 1) A telephone handset equipped with separate push-to-activate momentary - contact switches, one for the transmitter element and one for the receiver element. Either switch when not activated shorts the leads to its respective transducer and completely disconnects the transducer from the station mounting cord wires.
  - 2) A telephone handset equipped with a single push-to-activate momentary - contact switch. When the switch is not activated, the leads for both the transmitter element and the receiver element are shorted and are disconnected from the station mounting cord wires.
  - 3) A telephone handset equipped with both a single push-to-activate momentary contact switch and with an isolation amplifier that allows audio signals to travel from the station mounting cord to the receiver element but not from the receiver element to the station mounting cord. When the switch is not activated, the leads for the transmitter element are shorted together and are disconnected from the station mounting cord wires.
- x. Receiver Element: The speaker located in the handset or headset earpiece. This transducer converts audio-frequency electrical signals to acoustic signals that are audible when the earpiece is held against the user's ear.

- y. Ringer: An annunciator that cannot be used for voice calls, announcements, or paging. A ringer can only produce specific audible signals.
- z. Speaker: Any component among whose intended functions include performing as a transducer to produce a sound pressure analogue output from an input audio-frequency electrical waveform.
- aa. Speaker Microphone: Any component whose intended functions include performing both as a microphone and as a speaker.
- bb. Speakerphone: A feature that permits a telephone to be used without lifting the handset. A speakerphone may be physically incorporated into the telephone set or it may consist of one or more auxiliary units. A usable speakerphone contains a microphone or, microphone-amplifier combination, which is sensitive enough to pick up normal conversational speech levels at a distance of several feet and a speaker, or speaker-amplifier combination, which transduces normal telephone signal levels to sound pressure levels that can be heard at a distance of several feet.
- cc. Station Mounting Cord: A flexible assembly of individually insulated electrical wires enclosed in a common insulating jacket and fitted with terminating connectors used to provide the electrical connections between the main body of the telephone and the blocks or jacks that terminate the house cabling.
- dd. Telecommunications Medium: A means of transporting electrical information from one communications terminal to another.
- ee. Telephone: A voice terminal that, regardless of whatever other functions it performs, is a member terminal of a telephone network and accomplishes all the incoming and outgoing signaling and voice interfacing necessary for operation in that network.
- ff. Telephone Network: A network system that, regardless of whatever other functions it performs, provides temporary speech communications links between member voice terminals. The essential characteristics of a telephone network are [1] that it recognize when a member terminal is initiating a call (goes off-hook), [2] that it identify the terminal being called (number dialed), [3] that it annunciate the incoming call (rings the called terminal), and [4] that it maintain a voice grade communications channel between the calling and called terminals only for the duration of the call.
- gg. Transducer: A component of the telephone that either converts electrical signals to acoustic signals or acoustic signals to electrical signals: includes microphones, ringers, speakers, and speaker-microphones.

- hh. Transmitter Element: The microphone located in the handset or headset mouthpiece. This transducer converts acoustic signals spoken directly into the mouthpiece to analogue audio frequency electrical signals for transmission to the main body of the telephone.
- ii. TSG-Approved Telephone: TSG-approved, is synonymous with NTSWG-approved, status is awarded to telephones that have been technically evaluated by the government's National Telecommunications Security Working Group, formerly known as the Telephone Security Group, and determined to meet all applicable on-hook telephone audio security criteria. A NTSWG-approved telephone provides all necessary security features as intrinsic properties of the telephone itself.
- jj. Type-Accepted Telephone: NTSWG-approved telephone model that the NTSWG has evaluated in response to a formal application by its manufacturer, and has been approved and awarded a NTSWG type-acceptance number. The NTSWG telephone type-acceptance program is the primary vehicle for evaluating commercial telephones for NTSWG approval. NTSWG has issued type--acceptance standards that specify the on-hook security design, construction, and performance characteristics required for various genres of telephones and type-acceptance classes.
- kk. Uncontrolled/Unprotected Line or Telecommunications Medium: A telecommunications medium, such as a telephone wireline, that is not provided continuous positive physical protection against unauthorized, clandestine intercept of the information it is being used to convey.
- ll. VoIP Electronic Telephone: Telephone sets expressly designed to operate with Internet Protocol as the primary communication with the VoIP system and to obtain the various features and services offered by those VoIP system. These telephones are not compatible with normal central office service or circuit switched lines and cannot be connected directly to standard central office or circuit switched lines.
- mm. Voice Terminal: A generic term used to describe any device that, regardless of whatever other functions it performs, provides an intentional transmit and/or receive interface between a human talker/listener and an electric or electronic communications system. All voice terminals contain transducers; a microphone is necessary if there is a transmit function and a speaker if there is a receive function. Telephones, speakerphones, and intercom sets are common examples of voice terminals.

## ANNEX C

### LIST OF ACRONYMS

CBX	Computerized Branch Exchange
CKTS	Computerized Key Telephone System
CNSS	Committee on National Security System
CNSSI	Committee on National Security Systems Instruction
CPBX	Computerized Private Branch Exchange
COMSEC	Communications Security
CTS	Computerized Telephone System
DCID	Directive of Central Intelligence Directive
EPABX	Electronic Private Automatic Branch Exchange
Hz	Hertz
IC	Intelligence Community
IP	Internet Protocol
kHz	Kilo-Hertz
NSI	National Security Information
NSS	National Security Systems
NTS	National Telecommunications Security
NTSWG	National Telecommunications Security Working Group
Pa	Pascal – sound pressure unit
PABX	Private Automatic Branch Exchange
PSTN	Public Switched Telephone Network
OPSEC	Operational Security
PBX	Private Branch Exchange
RMS	Root of the Mean Squared
SCIF	Sensitive Compartmented Information Facility
TSCM	Technical Surveillance Countermeasures
TSG	Telephone Security Group
VoIP	Voice over Internet Protocol
$\mu$ Vrms	Electromyographic (EMG) Amplitude
WG	Working Group