

Technical Specifications for Broadband Terminal Equipment of Mobile Broadband Business

National Communications Commission (NCC)

12 March 2018

Technical Specifications for Broadband Terminal Equipment of Mobile Broadband Business

1. Legal sources

These specifications are promulgated pursuant to Item 1, Article 42 of the Telecommunications Act and Item 2, Article 4 of the Telecommunications Terminal Equipment.

2. Scope

The specifications are applicable to handheld and portable type-approved devices. According to its properties equipment is categorized as either Frequency Division Duplex (FDD) or Time Division Duplex (TDD).

The relevant frequency bands are as follows:

2.1 Frequency Division Duplex(FDD): 700 MHz (uplink 703 MHz-748 MHz\ downlink 758 MHz-803 MHz), 900 MHz (uplink 885MHz-915 MHz\downlink 930 MHz-960 MHz), 1800 MHz (uplink 1710 MHz-1785 MHz\downlink 1805 MHz-1880 MHz), 2100 MHz (uplink 1920 MHz-1980 MHz\downlink 2110 MHz-2170 MHz), 2500 MHz and 2600 MHz (uplink 2500 MHz-2570 MHz\downlink 2620 MHz-2690 MHz) bands.

2.2 Time Division Duplex(TDD): 2500 MHz and 2600 MHz bands (2500 MHz-2570 MHz, 2570 MHz-2620 MHz and 2620 MHz-2690 MHz).

3. Technical standard

These specifications are promulgated based on the Chinese National Standards CNS14958-1, CNS14959, CNS13438, CNS14336-1, CNS 15598-1, CNS15285, CNS 15364 and other international technical standards as references.

4. Definitions of the terms

4.1 Handheld mobile station devices:

The device can be used normally during movement and with the emission source up to 20cm away from the human body.

4.2 Portable mobile station devices:

The device can be used normally in non-specific locations with the emission source more than 20 cm away from the human body.

5. Testing items and eligibility criteria

5.1 Power limits:

5.1.1 Emission power limit:

- 5.1.1.1 Effective radiated power (ERP)
1W for handheld mobile station devices.
2W for portable mobile station devices.

- 5.1.1.2 The conducted output power limit.

FDD: 23 dBm +2.7/-3.2 dB.

TDD: 23 dBm +2.7/-2.7 dB. If the device is a high power user equipment (HPUE),the conducted output power limit is 26 dBm +2.7/-2.7 dB.

5.1.2 Testing methods:

- 5.1.2.1 During the measurement of emission power, devices must be used with RMS (root mean square) equivalent voltage to measure any continuous transmission time. The results of the measurement shall be used to adjust the correct emission power based on the responding time, resolution bandwidth capability and sensitivity of the device.

- 5.1.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the lowest level of bandwidth, 5MHz, and the highest level of bandwidth on each channel and shall comply with the provisions of Table 1.

5.2 Spectrum emission mask:

- 5.2.1 Limits of the spectrum emission mask: Shall comply with the spectrum emission mask specification values with the provisions of Table 2.
- 5.2.2 Testing methods:
 - 5.2.2.1 The spectrum emission mask limit values vary according to the bandwidth and Δf_{OOB} . The resolution bandwidth (RBW) during the measurement shall not be smaller than the set values with the provisions of Table 2.
 - 5.2.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the lowest level of bandwidth, 5MHz, and the highest level of bandwidth on each channel and shall comply with the provisions of Table 3.
- 5.3 Radiation emission limit outside the conduction band:
 - 5.3.1 The radiation emission outside the operating band shall comply with specification values of the out-of-band radiation with the provisions of Table 4.
 - 5.3.2 Testing methods:
 - 5.3.2.1 Frequency range of the out-of-band radiation measurement does not include Δf_{OOB} stated in 5.2.1. During the measurement, the resolution bandwidth shall not smaller than the set value with the provisions of Table 4.
 - 5.3.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the lowest level of bandwidth, 5MHz, and the highest level of bandwidth on each channel and shall comply with the provisions of Table 5.
- 5.4 The adjacent channel leakage ratio (ACLR) :
 - 5.4.1 The ACLR limit value is 29.2 dB. If the device is a HPUE, the ACLR limit value is 30.2 dB.
 - 5.4.2 Testing Methods:
 - 5.4.2.1 The ACLR is to detect the power ratio of the channel and its adjacent channel. During the measurement, the measurement bandwidth of the channels shall adhere to specification values with the provisions of Table 6. If the device is a HPUE, the measurement bandwidth shall adhere to Table 7.
 - 5.4.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the lowest level of bandwidth, 5MHz, and the highest level of bandwidth on each channel and shall comply with the provisions of Table 8.
- 5.5 Frequency stability:
 - 5.5.1 Under normal supply voltage, the temperature shall vary between -20°C and 50°C. At 10 °C as a unit, at different temperatures, results of the measurements shall be taken in increments of 0/2/5/10 minutes; the frequency should be maintained within 0.1PPM of the main wave frequency of the channel.
 - 5.5.2 The temperature at 20°C and the supply voltage within $\pm 15\%$ of the rating voltage value; results of the measurements shall be taken in increments of 0/2/5/10 minutes; the frequency should be maintained within 0.1PPM of the main wave frequency of the channel. If the allowable value of the operating voltage cannot reach $\pm 15\%$ of the rated voltage value, please take the self-declared voltage value of manufacturers.
- 5.6 Electromagnetic specific absorption rate (SAR):
 - 5.6.1 This test is applicable to handheld terminal equipment.
 - 5.6.2 The SAR standard value:

Compliance with CNS14959: Limits for exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) to partial body (any part of the head and surrounding area), 2.0 W/Kg (10 g). Compliance with CNS14958-1: Human Exposure to RF fields from hand-held and body-mounted wireless communication devices – Human models. Instrumentation, and procedures-Part 1: Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices in close proximity to the ear (frequency range of 300 MHz – 3 GHz).
- 5.7 Power density:
 - 5.7.1 This test is applicable to portable terminal equipment.

- 5.7.2 The maximum value of power density:
0.35mW/cm² for frequency 700MHz;
0.45mW/cm² for frequency 900MHz;
0.9mW/cm² for frequency 1800MHz;
1.0 mW/cm² for frequency 2100MHz, 2500MHz and 2600MHz.
- The measurement distance shall be 20 cm or less from the human body to the antenna declared by the device supplier.
- 5.8 The electromagnetic compatibility (EMC) test:
Shall comply with the standard specifications of CNS13438; devices to be tested shall be tested under the operating and idle modes (radiation disturbance) and the charging mode (conducted disturbance at the mains ports). Otherwise, tests shall not be conducted.
- 5.9 Electrical safety:
Shall comply with the standard regulations of CNS14336-1 or CNS15598-1.
- 5.10 Mobile station device connection interface, power adapter connection interface, charger cable and power adapter:
- 5.10.1 This test is applicable to mobile phones.
- 5.10.2 The connection interface shall adopt the basic structure shown as Figure B.1 in CNS 15285. If the socket of the mobile station device belongs to the specific socket shown as Figure B.1, the converter shall be adopted to connect the charger cable set or adaptor.
- 5.10.3 The rated charging current for power adapters shall comply with CNS 15285 B.2.1(c).
- 5.10.4 Mobile station device connection interface, power adapter connection interface, charger cable and power adapter shall comply with the universal features listed in CNS15285 B.2.2, and the no load power consumption of power adapters shall below 0.15W.
- 5.10.5 Mobile station devices shall use chargeable batteries and comply with CNS 15364.
- 5.10.6 The material type of the insulation material used in mobile station device connection interface and power adapter connection interface, shall comply with the standards above V-2 categorized in IEC 60695-11-10 or UL 94.
- 5.10.7 The fire resistance category of the charger cable shall comply with the standards above VW-1 categorized in IEC 60332-1 or UL 1581.
- 5.10.8 Mobile station device connection interface, power adapter connection interface, charger cable and power adapter can apply 5.10 to 5.13 sections of the specifications that were announced on October 18, 2016 by September 11, 2018.
- 5.11 Functions of public warning and disaster prevention messages.
- 5.11.1 This test is suitable for terminal devices with access voice services function that have been provided by mobile broadband service operators.
- 5.11.2 The public warning system (PWS) refers to the use of cell broadcast service (CBS) function of the mobile communication system. The CBS message identifier (MI) and the PWS alert contents will be sent by the base station to the receiving system of the terminal devices of a certain area.
- 5.11.3 Terminal devices shall have the ability to receive the message identifier (MI) and display PWS alert contents.
- 5.11.3.1 The language of the contents PWS alerts, message identifier, classification, preset receiving on or off, and the options of users, etc shall comply with the provisions of Table 9.
- 5.11.3.2 The mobile device has been set up to receive the PWS message identifier (MI). When the mobile device receives the PWS alert, the device should clearly display the alert text and the message identifier (MI) in the subject header. See Figure 1 as a reference.
- 5.11.3.3 Each message identifier shall be tested respectively following a PWS alert text.
- (1) The language of the PWS content in Traditional Chinese:
[The message is for public warning message testing] Your mobile phone operator has set up cell broadcasting systems for transmitting public warning messages. Now this service is still

in trial. We apologize for any inconvenience it may cause and appreciate your kind understanding.

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(2) The language of PWS content in English:

[The message is for public warning message testing] Your mobile phone operator has set up cell broadcasting systems for transmitting public warning messages. Now this service is still in trial. We apologize for any inconvenience it may cause and appreciate your kind understanding.

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5.11.3.4 Mobile devices should have the ability to recall alert messages for review by the user.

5.11.3.5 Mobile devices shall not support any user interface capabilities to forward received PWS alerts, or to copy and paste PWS alert contents.

5.11.4 Audio signal:

5.11.4.1 The audio signal shall be categorized into two kinds of signal: audio attention signal and audio general signal.

(1) Audio attention signal:

A. The audio attention signal shall have special audio frequency and special break duration.

The audio attention signal shall not be set up by the user or modified.

(A) Special audio frequency:

For devices that have polyphonic capabilities, the audio attention signal must consist of the fundamental frequencies of 853Hz and 960Hz transmitted simultaneously. For devices with only a monophonic capability, the audio attention signal must be 960Hz.

(B) Special break duration:

The audio attention signal must have a temporal pattern of one long tone of two seconds, followed by two short tones of one second each, with a half second interval between each tone. The entire sequence must be repeated twice with a half second interval between each repetition.

(C) The temporal pattern of audio attention signal is shown in Figure 2.

B. The audio attention signal must be restricted to use for alert messages under PWS.

(2) The general audio signal does not have special audio frequency and special break duration.

The general audio signal shall be set up by the user or modified into another pattern. When the mobile device receives the message, it shall produce the audio signal.

5.11.4.2 Generating timing: The mobile device has been set up to receive the PWS message identifier (MI). When mobile device receives the PWS alert, the device should produce corresponding audio signal as shown in Table 10 in accordance with the message identifier (MI) and the user's setting.

5.11.4.3 The audio signal is considered to be an opt-out by the user with the initial default configuration being that all emergency alerts are enabled.

5.11.4.4 When the mobile device activates the audio signal, the user may deactivate that audio signal prior to completion of the audio signal.

5.11.5 The vibration cadence:

5.11.5.1 The vibration cadence shall be categorized into two kinds of cadences: vibration attention cadence and general vibration cadence.

(1) Vibration attention cadence:

A. The vibration attention cadence must have the special break duration. The vibration attention cadence shall not be set up by the user or modified.

(A) Special break duration:

The vibration attention cadence must have a temporal pattern of one long vibration of two seconds, followed by two short vibrations of one second each, with a half second

interval between each vibration. The entire sequence must be repeated twice with a half second interval between each repetition.

(B) The temporal pattern of vibration attention cadence is shown in Figure 3.

B. The vibration attention cadence must be restricted to use for alert messages under PWS.

C. The signal between vibration attention cadence and audio attention signal does not need to be synchronized.

(2) The general vibration cadence shall not have special break duration. When the mobile device receives the message, the device will produce the general vibration cadence.

5.11.5.2 Generating timing: the mobile device has been set up to receive the PWS message identifier (MI). When mobile device receives the PWS alert, the device should produce corresponding vibration cadence as shown in Table 10 in accordance with the message identifier (MI) and the user's setting.

5.11.5.3 The vibration cadence is considered to be an opt-out by the user with the initial default configuration being that all emergency alerts are enabled.

5.11.5.4 When the mobile the device activates the vibration cadence, the user may deactivate that vibration cadence prior to its completion.

5.11.6 The presentation of the received PWS alert message should take priority over other mobile device functions. The PWS alert message shall not preempt an active voice or data session.

5.11.7 Measures of handling duplicate PWS alert messages:

5.11.7.1 Duplicate PWS alert message refers to PWS alert messages with the same message identifier and serial number, indicating that they have been sent repeated. The definition of serial number shall refer to the technical standard 3GPP TS 23.041.

5.11.7.2 Where the equipment receives duplicate PWS alert message from the base station, it shall not show the message content or generate signal and vibration.

5.12 IMEI number and unique guarantee:

Test equipment may read and record the IMEI number of the unique guarantee proposed by the applicant.

6. Test Requirement

6.1 Except as otherwise provided in these technical specifications, testing methods for 5.1.1, 5.3 and 5.5 shall be processed based on the inspection requirements stated in Point 5 of the Low-power Radio-frequency Devices Technical Specifications (LPRFD Technical Requirements). The inspection procedures shall be processed in accordance of the Appendix 1 "Referential Procedures of Inspecting Transmitters" of the Low-power Radio-frequency Devices Technical Specifications.

6.2 Section 5.8 to 5.10 of the specifications shall be tested with power adapter and charger cable set; for power adapters and charger cable sets that already received certificate of approval, it is a must to submit certificate of approval and testing report in order to be inspection (as stated in Section 5.10) free.

7. Warning Labels

7.1 Warning label of the electromagnetic wave

7.1.1 Warning Content: "Please ensure to use the device properly in order to reduce the impact of electromagnetic waves"

7.1.2 Labeling: Position the label on the device properly and put labels on the package and instruction manual.

7.2 Warning label of the electromagnetic specific absorption rate (SAR)

7.2.1 Warning Content: "The standard value of SAR is 2.0W/kg; the measured value of tested product is: ____ W/kg".

7.2.2 Labeling: Position the label on the device properly and put labels on the package and instruction manual.

Table 1: Test Parameters for Emission Power of the Channel Bandwidth

Ch BW	Downlink Configuration	Uplink Configuration	
	N/A for Max UE output power testing	Mod'n	RB allocation
			FDD TDD
1.4MHz		QPSK	1 1
1.4MHz		QPSK	5 5
3MHz		QPSK	1 1
3MHz		QPSK	4 4
5MHz		QPSK	1 1
5MHz		QPSK	8 8
10MHz		QPSK	1 1
10MHz		QPSK	12 12
15MHz		QPSK	1 1
15MHz		QPSK	16 16
20MHz		QPSK	1 1
20MHz		QPSK	18 18

Note: The test method of the RB offset setting value and testing items adhere to 3GPP TS 36.521 technical standards.

Table 2: Set Value of Spectrum Emission Mask

Emission Limit Value (dB)							Resolution Bandwidth (RBW)
Bandwidth Δf_{OOB} (MHz)	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
± 0 to 1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30kHz
± 1 to 2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 2.5 to 2.8	-23.5	-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 2.8 to 5		-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 5 to 6		-23.5	-11.5	-11.5	-11.5	-11.5	1MHz
± 6 to 10			-23.5	-11.5	-11.5	-11.5	1MHz
± 10 to 15				-23.5	-11.5	-11.5	1MHz
± 15 to 20					-23.5	-11.5	1MHz
± 20 to 25						-23.5	1MHz

Remarks: Δf_{OOB} refers to the frequency offset out-of-band (Δ Frequency of Out-of-band emission)

Table 3: Test Parameters for Spectrum Emission Mask of the Channel Bandwidth

Ch BW	Downlink Configuration	Uplink Configuration		
	N/A for SEM testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
1.4MHz		QPSK	5	5
1.4MHz		16QAM	5	5
1.4MHz		16QAM	6	6
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	4	4
3MHz		16QAM	15	15
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	8	8
5MHz		16QAM	25	25
10MHz		QPSK	50	50
10MHz		QPSK	12	12
10MHz		16QAM	12	12
10MHz		16QAM	50(Note 1)	50(Note 1)
15MHz		QPSK	75	75
15MHz		QPSK	16	16
15MHz		16QAM	16	16
15MHz		16QAM	75(Note 1)	75(Note 1)
20MHz		QPSK	100	100
20MHz		QPSK	18	18
20MHz		16QAM	18	18
20MHz		16QAM	100(Note 1)	100(Note 1)

Note 1: Applies only to UE-Categories ≥ 2

Note 2: The testing method of the RB offset setting value and testing items adhere to 3GPP TS 36.521 technical standards.

Table 4: Specification Values of the Out-of-Band Radiation

Frequency Range	Maximum Level	Resolution Bandwidth (RBW)
$9\text{kHz} \leq f < 150\text{kHz}$	-36 dBm	1kHz
$150\text{kHz} \leq f < 30\text{MHz}$	-36 dBm	10kHz
$30\text{MHz} \leq f < 1\text{GHz}$	-36 dBm	100kHz
$1\text{GHz} \leq f < 12.75\text{GHz}$	-30 dBm	1MHz

Table 5: Test parameters for Out-of-Band Radiation of the Channel Bandwidth

Ch BW	Downlink Configuration			Uplink Configuration		
	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25
5MHz				QPSK	1	1
10MHz				QPSK	50	50
10MHz				QPSK	1	1
15MHz				QPSK	75	75
15MHz				QPSK	1	1
20MHz				QPSK	100	100
20MHz				QPSK	1	1

Note: The testing method of the RB offset setting value and testing items adhere to 3GPP TS 36.521 technical standards.

Table 6: Specification Values of the Adjacent Channel Leakage Ratio (ACLR)

	Bandwidth					
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Adjacent Frequency Offset	±1.4MHz	±3MHz	±5MHz	±10MHz	±15MHz	±20MHz
Channel Measurement Bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Limit Value of the Adjacent Channel Leakage Ratio	29.2dB					

Table 7: Specification Values of the Adjacent Channel Leakage Ratio (For HPUE)

	Bandwidth					
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Adjacent Frequency Offset	N/A	N/A	±5MHz	±10MHz	±15MHz	±20MHz
Channel Measurement Bandwidth	N/A	N/A	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Limit Value of the Adjacent Channel Leakage Ratio	N/A	N/A	30.2dB			

Table 8: Test Parameters for Adjacent Channel Leakage Ratio of the Channel Bandwidth

Ch BW	Downlink Configuration			Uplink Configuration		
	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for ACLR testing			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM	6	6
1.4MHz				16QAM	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM	15	15
3MHz				16QAM	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				16QAM	25	25
5MHz				16QAM	8	8
10MHz				QPSK	50	50
10MHz				QPSK	12	12
10MHz				16QAM	50(Note 1)	50(Note 1)
10MHz				16QAM	12	12
15MHz				QPSK	75	75
15MHz				QPSK	16	16
15MHz				16QAM	75(Note 1)	75(Note 1)
15MHz				16QAM	16	16
20MHz				QPSK	100	100
20MHz				QPSK	18	18
20MHz				16QAM	100(Note 1)	100(Note 1)
20MHz				16QAM	18	18

Note 1: Applies only to UE-Categories 2-5

Note 2: The testing method of the RB offset setting value and testing items adhere to 3GPP TS 36.521 technical standards.

Table 9: The Language of PWS Alert Contents of Message Identifier, Classification, Preset Receiving On or Off, and Options of Users, etc.

Message identifier /Language of PWS alert contents		Classification	Preset receiving on or off	Options of user
911/Chinese	919/English	Alert Message	Preset receiving on	Yes
4370/Chinese	4383/English	Presidential Alert	Preset receiving on	No
4371/Chinese	4384/English	Emergency Alert	Preset receiving on	Yes
4372/Chinese	4385/English	Emergency Alert	Preset receiving on	Yes
4373/Chinese	4386/English	Emergency Alert	Preset receiving on	Yes
4374/Chinese	4387/English	Emergency Alert	Preset receiving on	Yes
4375/Chinese	4388/English	Emergency Alert	Preset receiving on	Yes
4376/Chinese	4389/English	Emergency Alert	Preset receiving on	Yes
4377/Chinese	4390/English	Emergency Alert	Preset receiving on	Yes
4378/Chinese	4391/English	Emergency Alert	Preset receiving on	Yes
4379/Chinese	4392/English	Emergency Alert	Preset receiving on	Yes
4380/Chinese	4393/English	Required Monthly Test	Preset receiving on	Yes

Table 10: Device should produce corresponding audio signal and vibration cadence in accordance with the message identifier (MI) and the user's setting.

Message identifier		User's setting			
		Deactivate sound	Activate sound	Deactivate vibration	Activate vibration
911	919	Can not produce audio signal	Produce audio general signal	Can not produce vibration cadence	Produce vibration general cadence
4370	4383		Produce audio attention signal		Produce vibration attention cadence
4371	4384				
4372	4385				
4373	4386				
4374	4387				
4375	4388				
4376	4389				
4377	4390				
4378	4391				
4379	4392				
4380	4393				

Figure 1: Example of PWS Alert Content and Headers

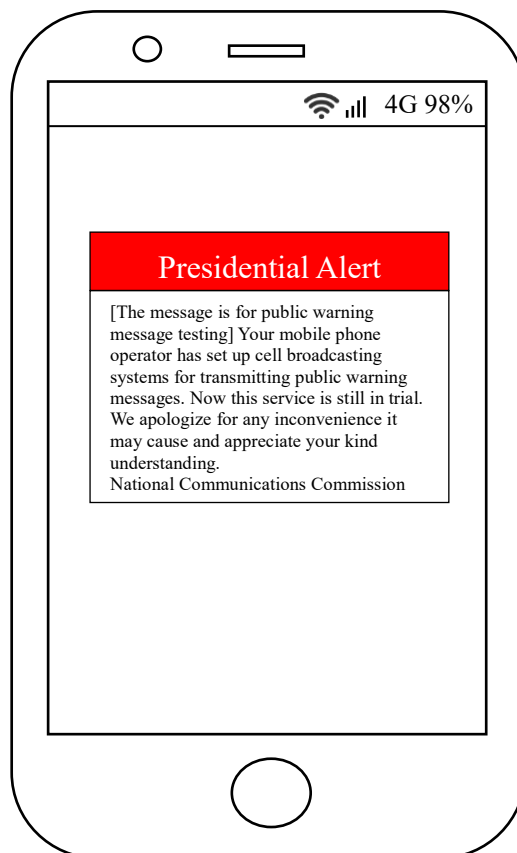


Figure 2: Pattern of Audio Attention Signal

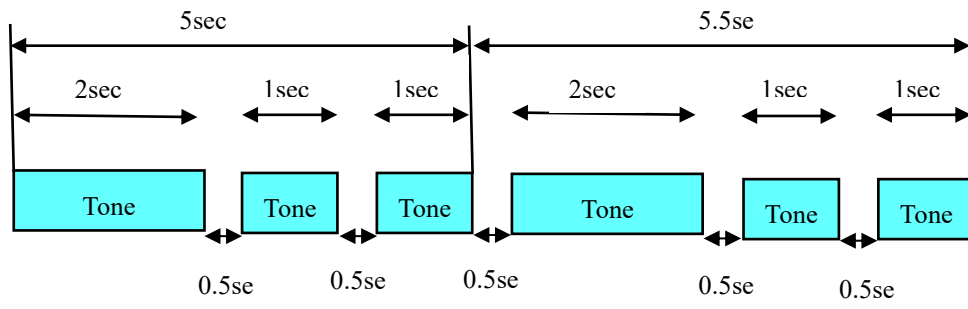


Figure 3: Pattern of Vibration Attention Signal

