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Technical requirements and test methods for BDS-3 regional short message communication user terminal

北斗三号区域短报文通信用户终端技术要求与测试方法

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3 Terms, definitions and abbreviations

3.1.1 regional short message communication (RSMC): the communication service providing users with short message communication, emergency search and rescue and position reporting within a given coverage area through the BeiDou geostationary orbit satellites.

3.1.2 to 3.1.5 The document distinguishes a smart terminal, which separates the operating system from the application software and allows both to be configured dynamically; a handheld terminal, operated while held in the hand; an ordinary user terminal, which can receive broadcast information, communicast, multicast and unicast messages and can send unicast and multicast messages, also called user terminal or user set; and a management terminal, which has all the functions of an ordinary user terminal and can

additionally receive and query the BeiDou short message information of its subordinate users and communicast to them.

3.1.6 to 3.1.7 unicast is point-to-point communication over the BDS-3 regional short message link; communicast is the mode in which a management terminal broadcasts the same short message information to all its subordinate users in a single short message transmission.

3.1.8 to 3.1.9 address: the unique number identifying an entity taking part in the BDS-3 regional short message service, divided into an intranet part and an extranet part. The extranet address is the unique number identifying an external user exchanging information with the BDS-3 system by unicast; a note gives mobile telephone numbers, WeChat user numbers and Weibo numbers as examples.

3.2 The abbreviations used are EIRP for equivalent isotropically radiated power and SAR for specific absorption rate.

4 Technical requirements

4.1 By function, BDS-3 regional short message communication user terminals are divided into management terminals and ordinary user terminals; by the way they are installed and used, into handheld, vehicle-mounted, ship-borne and airborne terminals; and by whether they support dynamic configuration of the operating system and the addition or removal of application software, into smart and non-smart terminals.

4.2 to 4.5 The outer surface of the terminal shall be free from defects such as dents, scratches, cracks and deformation; coatings and platings shall not blister, craze or peel; metal parts shall not corrode. The rated voltage range for normal operation is laid down in the product standard. The main unit, the antenna and other main parts shall carry a marking and a nameplate that are clear, conspicuous, firm and durable; the nameplate shall include the manufacturer name, the equipment serial number and the date of manufacture and shall comply with GB/T 13306-2011. The terminal shall have at least one input/output data interface.

4.6.1 The short message service functions are: it shall be able to send short messages supporting Chinese characters and codes; it shall be able to receive them; it shall have a communication receipt function; a management terminal shall have communicast and joint reception functions; it may be able to send messages to extranet addresses; and it may be able to receive information sent from extranet addresses.

4.6.2 For communication control the terminal shall have a frequency control function, able to control inbound applications according to the service rate (inbound transmissions that do not consume the rate, such as communication receipts, excepted), limiting over-rate inbound applications and giving a corresponding prompt; a parameter update function, able to respond to system access management commands, to adjust parameters such as

transmission rate, communication grade and inbound power and to work with the adjusted parameters while prompting the user; and an electromagnetic silence function, able to set itself to the electromagnetic silence state, to send a silence inbound application and to receive and signal the silence confirmation message.

4.6.3 For communication management the terminal shall have four transmission rates, 2 kbit/s, 4 kbit/s, 8 kbit/s and 16 kbit/s, and shall select the matching inbound rate automatically according to the message length; it shall have a no-response-beam inbound function, transmitting the inbound signal directly when it cannot lock any outbound beam; and it shall have a power-on report function, sending a power-on report automatically when switched on.

4.6.4 to 4.6.5 The information security requirements for smart terminals are: an application software security configuration capability, providing a mechanism to configure the behaviour of installed third-party application software when it calls the sending and receiving of short messages; pre-installed application software containing signature information that is genuine and valid; and a prohibition on processing transmitted information or transmitting false information in a way that makes the receiver identify a particular communicating party wrongly, on pre-installing application software able to alter short message prompt information or to serve the dissemination of information forbidden by national laws and regulations, and on pre-installing content forbidden by national laws and regulations, including but not limited to pictures, texts, menus, audio and video and applications. The terminal shall have a human-machine interaction function.

4.7.1 The transmission performance indicators are: EIRP not more than 36 dBm; transmission frequency accuracy not more than 0.5 parts per million; occupied bandwidth of the transmitted signal not more than 8.2 MHz; transmitted signal frequency range from 1610 MHz to 1626.5 MHz with centre frequencies of 1614.26 MHz and 1618.34 MHz; spurious emission meeting table 1; and protection of special frequency bands meeting table 2. Table 1 sets, for both the band from 30 MHz to 1580 MHz and the band from 1650 MHz to 12.75 GHz, a maximum level limit of minus 50 dBm measured in a 4 kHz bandwidth with root-mean-square detection. Table 2 sets a limit of minus 54 dBm measured in a 100 kHz bandwidth with root-mean-square detection for the bands 48.5 MHz to 72.5 MHz, 76 MHz to 118 MHz, 167 MHz to 223 MHz and 470 MHz to 702 MHz, and a limit of minus 40 dBm measured in a 1 MHz bandwidth for the bands 5725 MHz to 5850 MHz and 5905 MHz to 5925 MHz.

4.7.2 The reception performance indicators are: with a received signal level of minus 121.8 dBm, a bit error rate of not more than 1 in 100 000, with antenna elevation from 70 degrees to 90 degrees for handheld terminals and from 30 degrees to 90 degrees for other terminals, azimuth from 0 degrees to 360 degrees and a data segment information rate of 24 kbit/s; not fewer than four channels for receiving satellite signals; in conducted mode, with a reference sensitivity signal level of minus 127 dBm, a bit error rate of not more than 1

in 100 000; and receiver blocking meeting table 3. Table 3 gives two interference cases, one at 2472 MHz with a 20 MHz interference bandwidth and an interference level of minus 80 dBm, the other at 2520 MHz with a 10 MHz bandwidth and a level of minus 76 dBm; the wanted signal power, sensitivity plus 6 dB, and the bit error rate limit of not more than 1 in 100 000 appear once for the two rows.

4.7.3 to 4.7.4 The electromagnetic compatibility indicators refer the radiated emission limits below 1 GHz to A4.1 and A4.2 of table A.4 of GB/T 9254.1-2021 and those above 1 GHz to table A.5 of the same standard, the conducted emission limits to its table A.10, the electrostatic discharge immunity to contact discharge level 2 and air discharge level 3 of table 1 of GB/T 17626.2-2018 with the result meeting clause 9 b) of that standard, the radiated immunity to test level 2 of table 1 of GB/T 17626.3-2016 and, for terminals with an AC or DC power port with cables longer than 3 m, the conducted immunity to test level 1 of table 1 of GB/T 17626.6-2017; the terminal shall also withstand adjacent-channel interference from mobile communications, WLAN and Bluetooth, receiving and processing outbound communication correctly with a success rate of not less than 95 %. For terminals used within 20 cm of the human body, the electromagnetic radiation exposure limit shall meet the local SAR requirement of table 1 of GB 21288-2022.

4.8 The environmental adaptability requirements are an operating temperature from minus 20 degrees Celsius to 55 degrees Celsius and a storage temperature from minus 40 degrees Celsius to 70 degrees Celsius.

5 Test methods

5.1 The instruments and equipment used shall have been verified or calibrated, shall meet the measurement requirements and shall be within their validity period. Table 4 lists ten items with their descriptions and indicators: a BDS-3 regional short message signal broadcasting simulator, a BDS-3 regional short message inbound signal receiving simulator, test control and evaluation equipment, a rotatable test table, a spectrum analyser, a detector, an electromagnetic radiation specific absorption rate test system, a high and low temperature test chamber, a combiner and a blocking signal generator.

5.2 Table 5 maps the test items to the requirement clause, the test method clause and the test scenario, covering appearance, power supply, marking, interfaces, the five functional items (short message service, communication control, communication management, information security and human-machine interaction), the four performance items (transmission, reception, electromagnetic compatibility and electromagnetic field exposure) and environmental adaptability. Test environment one of figure 1 is used for the tests of 5.4.1, 5.4.2, 5.4.3, 5.5.1, 5.5.2 a), 5.5.2 b) and 5.5.2 c), and test environment two of figure 2 for the test of 5.5.2 d); the other test items use the test environments set up according to the relevant standards.

5.3 Appearance is checked by eye and by hand. For the power supply test the terminal