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**Technical requirements and test methods for the BDS PPP
service based on mobile communication networks**

基于移动通信网络的北斗精密单点定位（PPP）服务技术要求与测试方法

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Table of Contents

- 5 Basic Components
- 7 Technical Requirements
- 8 Test Environment Configuration
- 8.3 Test Preset Configuration
- 9 Test Methods
 - 9.1 Network Origin Location Test
 - 9.1.1 Broadcast Content Test
 - 9.1.2 Data Accuracy Test
 - 9.1.3 Update Cycle Test
 - 9.1.4 Latency Test
 - 9.1.5 Access Availability Testing
 - 9.1.6 Concurrency Capability Test
 - 9.1.7 Protocol Consistency Testing
 - 9.2 Terminal Origin Positioning Test
 - 9.2.1 Broadcast Content Test
 - 9.2.2 Data Accuracy Test
 - 9.2.3 Update Cycle Test
 - 9.2.4 Latency Test
 - 9.2.5 Access Availability Testing

5 Basic Components

PPP service based on mobile communication networks (hereinafter referred to as "network PPP service") is a service where user terminals use mobile communication networks to send data to the north. The Beidou positioning service platform (hereinafter referred to as the "Platform") requests and obtains Beidou PPP positioning assistance information, and the terminal combines this information with the Beidou satellite positioning information it receives. Based on satellite observation information, complete BeiDou precise point positioning.

Note. Data interaction between the platform and the data center is not within the scope of this document. The PPP network service process mainly involves three types of entities. platform, user terminal, and data center. The roles of each entity are described below. This relationship is shown in Figure 1.

a) Platform. A crucial entity responsible for processing user terminal location requests. Based on the service requests sent by the terminal, the platform uses mobile communication... The information network distributes the information to user terminals via unicast.

b) User terminal. Devices using the PPP network service can receive BeiDou satellite navigation signals and connect to the platform via mobile communication networks. Platform interaction. The user terminal receives BeiDou PPP positioning assistance information provided by the platform and adjusts the measured BeiDou position based on the assistance information. The BeiDou satellite navigation signal measurement values are corrected to obtain more accurate positioning results.

c) Data Center. A dedicated entity providing BeiDou PPP positioning assistance information. The data center generates data including satellite orbit corrections and clock biases. The system collects auxiliary information such as corrections, inter-code deviations, and user ranging accuracy markers, and sends this auxiliary information to the platform via a private interface.

6. Message Flow User terminals and platforms exchange capability information, auxiliary data, and location information through LPP messages. The specific message flow is shown in Figure 2.

7 Technical Requirements

7.1 Broadcast Content The PPP positioning assistance information broadcast by the platform for BeiDou B1I and B1C should include the following.

- a) Satellite orbit corrections;
- b) Satellite clock bias correction;
- c) Inter-symbol deviation correction;
- d) User ranging accuracy marker value. The data content included in the supplementary information should conform to Appendix B.

7.2 Data Accuracy The accuracy of the data in the BeiDou PPP positioning assistance information broadcast by the platform should meet the requirements of Table 2.

7.3 Update Cycle The data update cycle supported by the BeiDou PPP positioning assistance information broadcast by the platform should comply with the provisions of Table 3.

7.4 Delay The time difference between the platform receiving the BeiDou PPP positioning assistance information request and the platform broadcasting the corresponding assistance information is defined as the latency, which should not exceed 1 second.

7.5 Access Availability The availability of network PPP service provided by the platform should be no less than 99.9%.

Note. Access availability refers to the probability that the platform can provide auxiliary data that meets accuracy requirements when receiving continuous access requests from terminals.

7.6 Concurrency Capability The platform should support a concurrency capacity of no less than 5000 times/second.

7.7 Protocol Consistency The network PPP services provided by the platform should comply with the following protocol requirements.

- a) The broadcast of BeiDou PPP service auxiliary information is based on LPP message encapsulation;
- b) The LPP message encapsulation is carried in the SUPL

8 Test Environment Configuration

8.1 Test Network Concurrency capability testing. Set up the test environment according to Figure

3. Other general test items such as broadcast content, data accuracy, and update cycle are shown in Figure 4. Set up the test environment.

8.2 Test Objects The test targets specified in this document are platforms that provide network PPP services.

8.3 Test Preset Configuration

8.3.1 Network Origin Location The following conditions must be met.

- a) The standard user terminal is operating normally and supports network PPP services;
- b) The information parsing system is operating normally and supports the parsing of information exchanged between user terminals and the platform;
- c) The user plane positioning agent is operating normally and requests positioning results from the platform via the mobile communication network;
- d) Set the satellite signal source test parameters according to Table 4.

8.3.2 Terminal Origin Positioning The following conditions must be met.

- a) The standard user terminal is operating normally and supports network PPP services;
- b) The information parsing system is operating normally and supports the parsing of information exchanged between user terminals and the platform;

c) The user plane positioning agent is operating normally and requests location information from the user terminal through the mobile communication network;

d) Set the satellite signal source test parameters according to Table 4.

8.4 Test Items Both network origin location and terminal origin location tests should comply with the requirements in Table

5. Except for the optional concurrency capability test, the remaining tests should also comply with the requirements in Table 5. He selected the required test items.

9.1.1 Broadcast Content Test

9.1.1.1 Test Objective By exchanging information between the user terminal and the platform, the data content broadcast by the platform in the network origination location is verified.

9.1.1.2 Test Conditions Both the user terminal and the platform are running normally, and they interact with each other via the SUPL protocol.

9.1.1.3 Test Procedure The specific testing process is described as follows:

- a) Connect the components as shown in Figure 4, and activate the satellite signal source for the test scenario;
- b) Enable the user plane positioning agent to request the user terminal's location information from the platform, completing the network PPP service process;
- c) Use an information parsing system to parse the information exchanged between the user terminal and the platform;
- d) Verify that the LPP message correctly encapsulates the track correction, clock correction, inter-symbol offset correction, and user ranging accuracy. Record the value.

9.1.1.4 Expected Results The data content of the BeiDou PPP positioning assistance information broadcast by the platform meets the requirements of 7.1.

9.1.2 Data Accuracy Test

9.1.2.1 Test Objective The accuracy of information broadcast by the platform during network origination positioning is verified through information interaction between the user terminal and the platform.

9.1.2.2 Test Conditions Both the user terminal and the platform are running normally, and they interact with each other via the SUPL protocol.

9.1.2.3 Test Procedure The specific testing process is described as follows:

- a) Connect the components as shown in Figure 4, and activate the satellite signal source