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**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 20851.4-2019**

Replacing GB/T 20851.4-2007

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**Electronic toll collection - Dedicated short range  
communication - Part 4: Equipment application**

电子收费 专用短程通信 第4部分：设备应用

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## Table of Contents

- 1 Scope
- 2 Normative references
- 3 Schematic of the width of the communication area
- 3.1 Terms and definitions The terms and definitions defined in GB/T 20135-2006 and
- 4 General rules of application
- 4.2 General requirements for OBE data
- 5 General technical requirements for key equipment
- 5.1 OBE overall technical requirements
- 5.1.4 Parts
- 5.2 RSE overall technical requirements
- 6 OBE data structure

## Foreword

GB/T 20851 `` Special short-range communication for electronic toll collection " is divided into 5 parts.

- Part 1. physical layer;
- Part 2. Data link layer;
- Part 3. Application layer;
- Part 4. Equipment application;
- Part 5. Test methods for main parameters of the physical layer. This part is Part 4 of GB/T 20851. This section is drafted in accordance with the rules given in GB/T 1.1-2009. This section replaces GB/T 20851.4-2007 "Special short-range communication for electronic tolling-Part 4. Equipment application", and GB/T 20851.4- Compared with.2007, the main technical changes in addition to editorial changes are as follows:
  - Modified some normative references (see Chapter 2, Chapter 2 of the.2007 edition);
  - Added normative references for battery requirements and transportation safety (see Chapter 2);
  - Amended some abbreviations (see 3.2, 3.2 of.2007 version);
  - Modified the ETC application requirements only for two-chip applications (see 4.1,

4.1 of the.2007 version);

--- Deleted the file types in the OBE data organization (see Table 1 of the.2007 edition);

--- Deleted the key code in the OBE key (see Table 2 of the.2007 edition);

## 1 Scope

China's national equipment application specification for electronic toll collection DSRC - the part that turns the communication stack of Parts 1 to 3 into a working toll transaction. It is Part 4 of GB/T 20851 and specifies the general rules for applying DSRC equipment, the general technical requirements for the key equipment, the on-board equipment data structures, the application interfaces, the application security and the transaction processes, and it applies to electronic toll collection on highways and urban roads. This is where the national system is actually defined. The earlier parts describe how two devices talk; this one describes what they say and in what order, and it fixes the data held in the on-board unit as a file structure - the system key file, the system information file, the vehicle information, the contract and the transaction records - so that any compliant roadside unit in the country can read any compliant on-board unit. It defines the transaction processes themselves: the sequence of exchanges by which a vehicle is identified, its entitlement checked, the toll computed and written, and the record closed, including what happens when the vehicle leaves the zone part-way through. And it defines the application security, which is the part with money behind it. The on-board unit carries authentication keys and the transaction is signed, because the incentive to forge an on-board unit or replay a transaction is direct and financial, and a tolling system whose transactions cannot be proved cannot be enforced. Issued on 10 May 2019 and in force since 1 December 2019, it replaces GB/T 20851.4-2007.

This part of GB/T 20851 specifies the general rules for the application of short-range communication equipment for electronic toll collection and the general technical requirements for key equipment Requirements, OBE data structures, application interfaces and application security, transaction processes. This section applies to electronic toll systems for highways and urban roads. References can be made to areas such as automatic vehicle identification and vehicle access management.

## 2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this article Pieces. For undated references, the latest version (including all amendments) applies to this document.

GB/T 2312 Basic set of Chinese character encoding character set for information exchange

GB/T 2423.5-1995 Environmental testing for electric and electronic products Part 2. Test methods Test Ea and guidelines. Impact

GB/T 2423.10-2008 Environmental testing for electric and electronic products Part 2. Test methods Test Fc. Vibration (sine)

GB/T 2423.18-2012 Environmental test Part 2. Test method Test Kb. Salt spray, alternating (sodium chloride solution)

GB/T 3482-2008 Lightning test method for electronic equipment

GB/T 4208-2017 enclosure protection level (IP code)

GB/T 9254 Radio disturbance limits and measurement methods for information technology equipment

GB/T 17618 Limits and measurement methods for immunity of information technology equipment

GB/T 17626.2 Electromagnetic compatibility test and measurement technology Electrostatic discharge immunity test

GB/T 18655 Limits and measurement methods for radio disturbance characteristics of vehicles, ships and internal combustion engines to protect on-board receivers

GB/T 20135-2006 Intelligent Transportation System Electronic Toll System Framework Model

GB/T 20839-2007 General terms for intelligent transportation systems

GB/T 20851.1-2019 Short-distance communication dedicated to electronic charges Part 1. Physical layer

### **3 Schematic of the width of the communication area**

5.2.8 Power supply RSE equipment should work normally under the power supply condition of AC voltage  $220 \times (1 \pm 15\%)$  V and frequency  $50 \times (1 \pm 4\%)$  Hz.

5.2.9 Reliability The RSE should be greater than 70,000h.

5.2.10 Environmental conditions Environmental conditions should meet the following requirements.

a) Working temperature.  $-20\text{ }^{\circ}\text{C} \sim 55\text{ }^{\circ}\text{C}$ , cold area  $-35\text{ }^{\circ}\text{C} \sim 40\text{ }^{\circ}\text{C}$ ;

b) Storage temperature.  $-20\text{ }^{\circ}\text{C} \sim 55\text{ }^{\circ}\text{C}$ ;

c) Relative working humidity.  $4\% \sim 100\%$ ;

d) Vibration. It shall meet the requirements for the severity level of equipment application given in the first line of Table C.1 in Appendix C of GB/T 2423.10-2008 The frequency range is 10Hz  $\sim$  150Hz, the acceleration is  $5\text{m/s}^2$ , and the number of frequency sweep cycles in each axis direction is 50;

e) Shock. It should meet the requirements of the severe level given in the third line of Table 1 in Chapter 5 of GB/T 2423.5-1995, and the peak acceleration 300m/s<sup>2</sup>, the corresponding nominal pulse duration is 18ms, and the corresponding speed change is half-sine is 3.4m/s;

f) Salt spray. It should meet the severe level 1 of GB/T 2423.18-2012;

g) Lightning strike. It should comply with GB/T 3482-2008, power line lightning strike severity level 4, signal line lightning strike severity level 2, power cord and signal Lightning Strike Severity Level 4 between lines.

5.2.11 Degree of protection The RSE (outdoor part) enclosure protection level should meet the requirements of IP65 in GB/T 4208-2017.

5.2.12 EMC performance The radio disturbance performance index of the RSE shall meet the corresponding requirements of Class B in GB/T 9254. The immunity performance of RSE shall meet the corresponding performance criteria specified in GB/T 17618.

5.2.13 Other requirements The RSE equivalent omnidirectional radiated power should be within the range specified in GB/T 20851.1-2019 Table 1 and can be adjusted.

### **3.1 Terms and definitions The terms and definitions defined in GB/T 20135-2006 and**

GB/T 20839-2007 apply to this document.

3.2 Acronyms The following abbreviations apply to this document. AVI. Automatic Vehicle Identification (Automatic Vehicle Identification) DID. DirectoryIdentifier DSRC. DedicatedShortRangeCommunication ETC. Electronic Toll Collection FID. File Identifier ICC. Integrated Circuit Card MAC. Message Authentication Code OBE. On-Board Equipment RSE. Roadside Equipment UI. UnnumberedInformation

## **4 General rules of application**

4.1 ETC system composition The ETC system consists of a front-end system and a background database system. The front-end system includes a lane control system, RSE, OBE, and ICC. OBE should be a two-chip type, supporting ICC read and write. In ETC applications, the two-chip type OBE involves the function of electronic payment Realized by ICC, OBE provides ICC to RSE information forwarding function. The composition of the ETC system is shown in Figure 1. Content. Figure 1 ETC system structure An example of a typical two-chip OBE ETC transaction is shown in Figure 2. Figure

### **4.2 General requirements for OBE data**

4.2.1 The data in OBE is organized using directories and files.