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

GB/T 20851.2-2019

Replacing GB/T 20851.2-2007

**Electronic toll collection - Dedicated short range
communication - Part 2: Data link layer**

电子收费 专用短程通信 第2部分：数据链路层

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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 the second part 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 20851.2-2007 "Special short-distance communication for electronic charging part 2. Link data layer" Compared with GB/T 20851.2-2007, in addition to editorial changes, the main technical changes are as follows:

- Modified the content of normative references (see Chapter 2, Chapter 2 of the.2007 edition);
- Modify the parameter definition and parameter value of the main parameter Tu of the link layer, and modify the parameter value of N1 (see Chapter 5,.2007 Chapter 5 of the annual edition);
- Removed the main parameters of the link layer T3 and N2 (see Chapter 5 of the.2007 edition);
- Increased the definition and value of the main parameters of the link layer T4a, T4b, Tr1, Tr2 (see Chapter 5);
- Modified the value of bits 3-0 in the downlink MAC control domain (see 6.3.1,.2007 version 6.3.1);
- The value of the uplink MAC control domain bit 4-0 has been modified (see 6.3.2,.2007 version 6.3.2);
- Added provisions for time window management in the MAC sublayer (see 8.1). This section is proposed and managed by the National Intelligent Transportation System Standardization Technical Committee (SAC/TC268). This section was drafted by: Highway Research Institute of the Ministry of Transport, Zhongguancun CCCC Guotong Intelligent Transportation Industry Alliance, Beijing CCCC Guotong Intelligent Transportation System Technology Co., Ltd., Beijing Sutong Technology Co., Ltd., Shenzhen Jinyi Technology Co., Ltd., Beijing Juli Technology Co., Ltd. Co., Ltd., Shanghai Changjiang Intelligent Data Technology Co., Ltd., Beijing Wanji Technology Co., Ltd., Shenzhen Chenggu Technology Co., Ltd., Guangzhou Aite Communication Equipment Co., Ltd. The main drafters of this section. Chen Bingxun, Liu Hongwei, Zhang Beihai, Liu Yongping, Gui Jie, Li Wei, Zhao Yuyang, Zhou Jian, Wu Zhaojiong, Zhang Yujun, Lu Liyang. The previous versions of the standards replaced by this section are.
- GB/T 20851.2-2007. Dedicated short-range communication for electronic toll collection Part 2. Data link layer

1 Scope

China's national data link layer specification for electronic toll collection DSRC. It is Part 2 of GB/T 20851 and specifies the main parameters of the data link layer, the information frames, the requirements for establishing and releasing the dedicated communication link, and the MAC and LLC sublayers, and it applies to electronic toll collection on highways and urban roads, with reference use in automatic vehicle identification and vehicle access

management. The data link layer of a tolling system has to solve a problem that ordinary networking does not face. The roadside unit is talking into a lane through which several vehicles may be present in the communication zone at once, each carrying an on-board unit that has just appeared and will disappear within a fraction of a second, and every one of them must be identified, allocated capacity, transacted with and released before it leaves. There is no time for contention resolution of the kind a normal network can afford. The medium access control is therefore centralised and deterministic: the roadside unit controls the channel completely, polls and allocates windows, and the on-board units transmit only when addressed. This part defines that mechanism - the frame structures and their fields, the addressing, the private and broadcast link establishment and release, the acknowledgement and error handling, and the parameters that bound the timing. The logical link control sublayer above it provides the service the application layer of Part 3 uses. Getting this layer wrong does not produce a slow system; it produces missed vehicles and disputed transactions, which is why the specification is national rather than left to the equipment suppliers. Issued on 10 May 2019 and in force since 1 December 2019, it replaces GB/T 20851.2-2007.

This section of GB/T 20851 specifies the main parameters, information frames, and dedicated communication chains of the data link layer for short-distance communication dedicated to electronic toll collection. Requirement for establishment and revocation of routes, MAC sublayer, LLC sublayer. 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. For undated references, the latest version (including all amendments) applies to this document.

GB/T 7421-2008 High-level data link control (HDLC) procedures for remote communication and information exchange between information technology systems

GB/T 15629.2-2008 Information technology systems for remote communication and information exchange specific requirements for local area networks and metropolitan area networks Part 2. Logical link control

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 Terms and definitions

The terms and definitions defined in GB/T 20839-2007 and GB/T 20851.1-2019 apply to

this document.

4 Encapsulation format of the second layer information frame

6.2.2 Frame start flag and frame end flag The format of the frame start flag and frame end flag are binary sequences 01111110. The frame end flag of the previous frame cannot be used as the frame start flag of the next frame. If the receiving end receives multiple consecutive frame start flags, the last one is used as the start of the frame.

6.2.3 Preamble and Postamble For the preamble and postamble, see Chapter 6 and Chapter 7 of GB/T 20851.1-2019.

6.2.4 Transparent transmission The information between the start of frame flag and the end of frame flag, excluding the start of frame flag and the end of frame flag, should be interpolated to zero.

- a) The sending end inserts a "0" after sending five "1s" in succession;
- b) The receiver checks the sixth bit when it receives five "1" s in a row.

--- If the sixth bit is "0", delete the "0"; if it is "1", check the seventh bit;

--- If the seventh bit is "0", it indicates the start or end flag; if it is "1", the receiving end regards the information frame as invalid Frame and discard.

6.2.5 MAC Address Media access addresses are divided into broadcast MAC addresses and dedicated MAC addresses. Broadcast MAC address is used by RSU for all OBUs Access; The dedicated MAC address is used to access a specific OBU. The broadcast MAC address value should be 32-bit all "1" bits. 0xFFFFFFFF; the private MAC address value should be 32-bit non-all "1" bits.

5 Link layer main parameters

The main parameters of the link layer are shown in Table 1. Table

1 Main parameters of the link layer

Parameter	parameter definition	parameter value
160	μs minimum interval between T1 downlink frame and the next adjacent uplink frame	Minimum interval between T2 uplink frame and subsequent adjacent downlink frame
32	μs Tu public uplink window duration	3ms N1 dedicated link establishment request delay counter
0 ~ 2	T4a Maximum time before a dedicated uplink window transmission starts	6.84ms T4b Maximum time before a common uplink window transmission starts
480	μs Tr1 common downlink frame retransmission interval	10ms Dedicated downlink frame retransmission interval with the same Tr2 link identifier
10ms	N3 internal transfer counter-	N4 acknowledge timer-

Note. This section does not specify the parameter values of N3 and N4.