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## The Data Collection and Transmission Protocol for Geo-hazards Monitoring in China

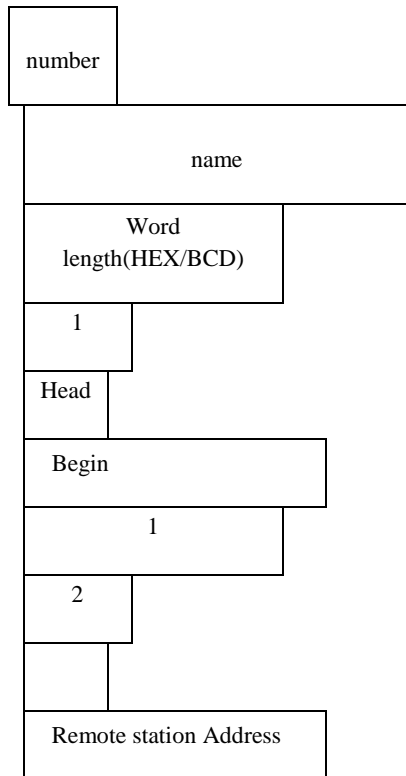
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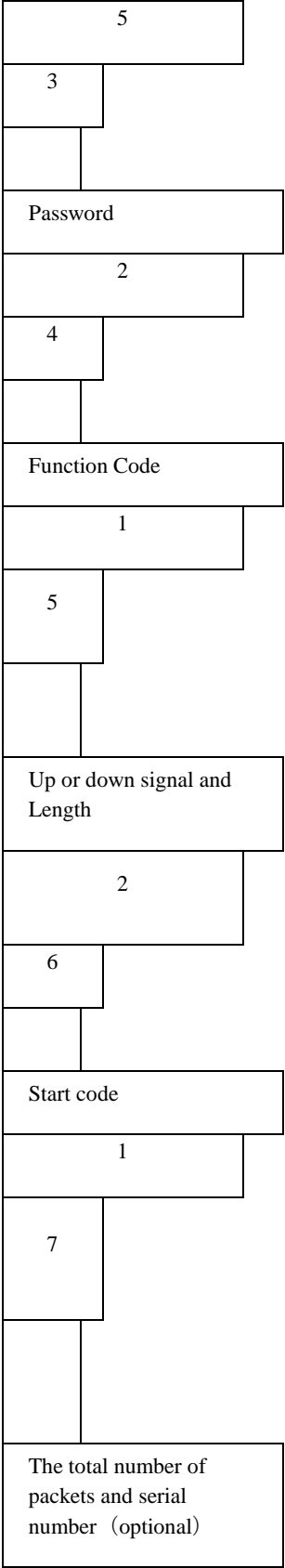
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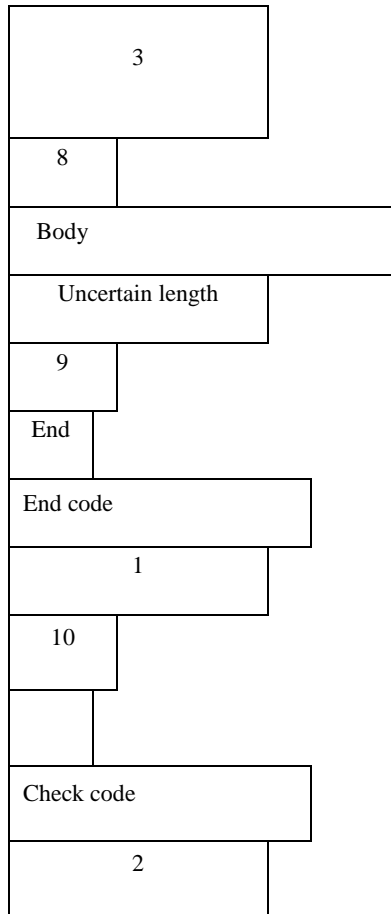
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The geo-hazards take place more and more frequently due to extreme weather events, earthquakes, human activities and other factors in recent years, while the lack of unified protocol for the data collection and transmission of the geo-hazards monitor system has greatly block the development of automatic monitoring and early warning of geo-hazards. Therefore, it is a top priority to propose an practical data collection and transmission protocol to ensure standard monitoring, intergradations and sharing of data, in which the early warning is based. The existing monitoring systems were built by different companies, and each of them is incompatible with others in data sharing. So the basic premise of the protocol is to compatible the built system.

The monitoring system is comprised of RTU(Remote Terminal Unit) and SCDA(Supervisory Control And Data Acquisition), the study of the protocol contains data acquisition and data transmission. To in line with the international standard, the protocol is designed in accordance with the international standard cluster IEC101~IEC104 and Binary synchronous communication protocol(BSC) of IBM. The frame structure of the protocol is shown in table 1.







Under the frame structure, all the data collected by the geo-hazards monitoring system are transmitted in the same data format. On the same way, the sharing and online processing of the data will be more efficient. In this study, the data format of the general sensors used to monitor the factors of geo-hazards have been designed, such as rain gauge, mud meter, water level gauge, etc. Until now, the geo-hazards monitoring system obeying this protocol has been working in Yunnan province and Three Gorges Reservoir area. The practice has proved that the data collection and transmission protocol for the geo-hazard monitoring greatly improves the sharing and online processing efficient of the geo-hazards monitoring, and also lays foundations for the early warning of geo-hazards.

*Table 1: Frame Structure of the Protocol*

*References:*

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 [2]Su, B. et al. (2008). ITESS , 2: 1124-1128.  
 [3]Zhang, T. et al. (2012). J Natural Disasters 21: 108-111

