Intelligent Transport Systems — Interface Protocol and Message Set Definition between Traffic Signal Controllers and Detectors

Systèmes intelligents de transport — Protocole d'interface et définition des ensembles de messages entre régulateurs de signaux de circulation et détecteurs
Contents

Foreword ............................................................................................................................................................ iv
Introduction ......................................................................................................................................................... v
1 Scope ...................................................................................................................................................... 1
2 Normative references ............................................................................................................................ 2
3 Terms and definitions ........................................................................................................................... 2
4 Abbreviated terms ................................................................................................................................. 2
5 Interface protocol for traffic controller ............................................................................................... 3
5.1 Relationship to other standards ........................................................................................................ 3
5.2 Identification detector index ................................................................................................................ 3
5.3 Detector classification .......................................................................................................................... 4
6 Interface messages for traffic signal controller ................................................................................. 5
6.1 General frame structure ....................................................................................................................... 5
6.2 Detector information messages structure .......................................................................................... 7

Annex A (normative) Interface Protocol Message Set Definition between Traffic Signal Controllers and Detectors data structure and data type definition .................................................................... 16

Annex B (informative) Interface Protocol and Message Set Definition between Traffic Signal Controllers and Detectors implementation example .................................................................. 23

Bibliography ...................................................................................................................................................... 25
Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10711 was prepared by Technical Committee ISO/TC 204, Intelligent transport systems.
Introduction

Real-time traffic signal control systems use traffic detectors to obtain traffic flow information. Each detector has its own method for collecting traffic information. Most popular is the loop detector which reports traffic data through detection of vehicle occupancy. Each method supporting different forms of detection has its own merits and disadvantages and uses a variety of message sets and protocols for communication which complicates their integration into systems.

There are two methods for integrating different types of traffic detectors. One method is to select and/or analyse the necessary information from detectors using their own message sets. The second method is to standardize the message sets and protocols to be used for the interface between detectors and traffic signal controllers. The former has the disadvantage that the signal controller must be customized each time a new detector type is introduced. The latter approach has the advantage of supporting consistent collection of traffic data without consideration of detectors' detection principles and characteristics. Thus, the second method has advantages when the use of the data is known.

This International Standard defines detector message sets applicable to traffic signal control. There are three different message sets according to the detection method: occupancy based; image processing based; and vehicle identification based. All detectors should be assigned to one of these three categories. The message sets do not contain hardware information and additional information that is not critical to the traffic signal control.

Regardless of their physical functions or manufacturing methods, all current traffic detectors can use one of the three types of message sets for communicating with traffic controllers. Using this International Standard, there is no need to include specific manufacturer's technical codes as a part of the data exchange.

This International Standard allows the signal controller to query and change the detector settings for the commonly applicable contents such as attributes identifying the installed location of the detector. For image processing based detectors, this International Standard includes minimal well-known generic camera control commands.

The encoding rules and lower layers of the OSI communications stack\(^2\) (e.g. transport) are left to national standards.

The benefits are

a) all detectors can adopt one of the three types of predefined message sets, thus configuration of traffic detector system for traffic signal control becomes more simple regardless of hardware properties and manufacturing method,

b) it is not necessary to replace or revise traffic signal controller software when a new type of detector is installed and a new detector adopting one of the three message sets will not have communications interoperability problems, as all of the necessary information items for signal control have been considered, and

c) minimizing the communications load achieved with the compact size of predefined information; this advantage can be applicable to short range wireless communication with its weakness in the multi-channel simultaneous communication owing to hand-shaking and frequency interference.

Annex B provides an informative example of how the interface protocol and message sets are implemented.