SLOVENSKI STANDARD
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Javni prevoz - Sistemi za časovno razporejanje in nadzor cestnih vozil - 3. del: Vsebina sporočil WORLDFIP

Public transport - Road vehicle scheduling and control systems - Part 3: WorldFIP message content

Öffentlicher Verkehr - Straßenfahrzeuge - Planungs- und Steuerungssysteme - Teil 3: WORLDFIP

Transports publics - Systèmes d'ordonnancement et de contrôle des véhicules routiers - Partie 3 : Contenu de messages WorldFIP

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SIST-TS CEN/TS 13149-3:2009 **en**

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Public transport - Road vehicle scheduling and control systems - Part 3: WorldFIP message content

Transports publics - Systèmes d'ordonnancement et de contrôle des véhicules routiers - Partie 3 : Contenu de messages WorldFIP

Öffentlicher Verkehr - Straßenfahrzeuge Planungs- und Steuerungssysteme - Teil 3: WORLDFIP Nachrichteninhalt

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Foreword

This document CEN/TS 13149-3:2007 has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This Technical Specification is intended to be developed into part 3 of EN 13149, which gives rules for on-board data transmission systems.

This part 3 together with part 1 and part 2 of EN 13149 describes a complete solution independent from part 4, part 5 and part 6.

This document uses terms which are already used in other standards e.g. EN 12896 *Road transport and traffic telematics - Public transport - Reference data model*, when applicable.

1 Scope

This Technical Specification specifies the choice and the general application's rules of an onboard data transmission bus between the different equipment for service operations and monitoring of the fleet. This applies to equipment installed onboard buses, trolley-buses and tramways only as part of a bus fleet operation. It excludes tramways when they are operated as part of a train, subway or metro operation. This equipment includes operation aid systems, automatic passenger information systems, fare collection systems, etc.

The equipment directly related to the safety-related functioning of the vehicle (propulsion management, brake systems, door opening systems, etc...) are excluded from the scope of the present standard and are dealt with in other standardisation bodies.

For the described application two bus systems are standardised. Part 1 to part 3 of EN 13149 describe the WorldFIP bus system and part 4 to part 6 describe the CANopen bus system. There is no ranking between the two bus systems.

The present Technical Specification covers the link between equipment inside a single vehicle. Although it could be applied to multiple vehicles, this application is not explicitly covered by this standard.

Part 1 of EN 13149 specifies the WorldFIP-based network. This specification describes the general architecture in terms of hierarchical layers according to the ISO reference model for Open Systems Interconnection (OSI) specified in ISO 7498.

Part 2 of EN 13149 specifies in detail the connectors and the connector pin assignment and the cabling.

Part 3 (this Technical Specification) specifies in detail the application profiles for a simple network.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12896:2006, *Road transport and traffic telematics - Public transport - Reference data model*

EN 13149-1; *Public transport - Road vehicle scheduling and control systems - Part 1: WORLDFIP definition and application rules for onboard data transmission*

EN 13149-2; *Public transport - Road vehicle scheduling and control systems - Part 2: WORLDFIP cabling specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12896:2006 apply.

4 Vehicle related identifiers and numbers

4.1 General

The Vehicle ID is assigned uniquely by the system designer to the vehicle. Usually it refers to the vehicle ID containing the number given inside of the main computer or the number is coded by a fixed connector at the main computer (see Figure 1: x).

The Body ID assigned by the system designer refers to the body ID containing the readable identification on the vehicle body. Usual this text is printed on the vehicle body (see Figure 1: y).

The Radio ID assigned by the system designer refers to the radio ID containing the textual radio address of the bus. This address is necessary for selective calls to this bus (see Figure 1: z).

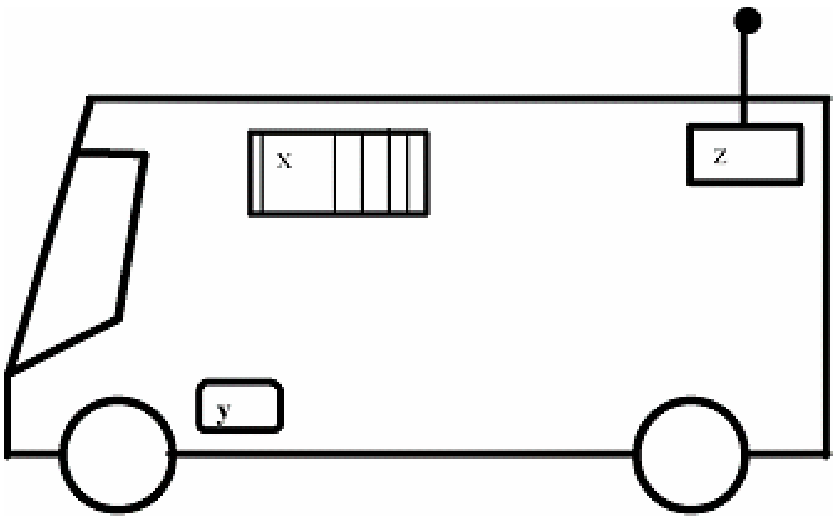


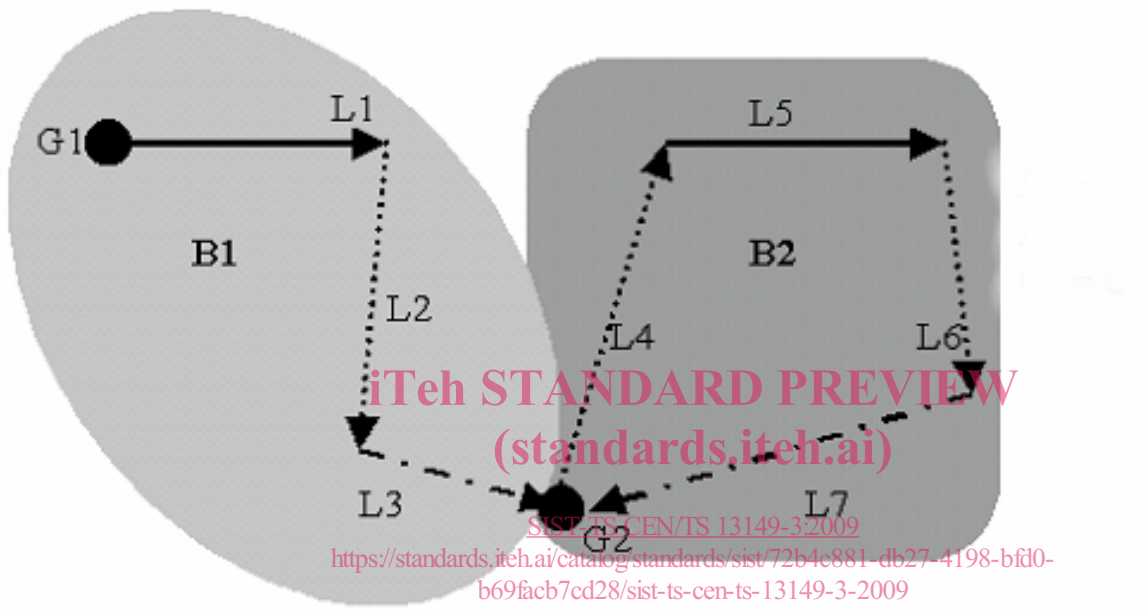
Figure 1 — Vehicle related identifiers and numbers

4.2 Vehicle operation identifiers and numbers

The Garage ID assigned by the system designer refers to the garage ID object containing the textual description of the depot or garage, where a vehicle is going to be parked during the night (see Figure 2).

The Block ID assigned by the system designer indicates the work of a vehicle from the time it leaves a parking point (depot, garage) after parking until its next return to park at a parking point. Any subsequent departure from a parking point after parking marks the start of a new block. A block should consist of one or several lines (see Figure 2). The Block ID refers to the Block ID object containing the textual description of the block.

The Line ID assigned by the system designer refers to the Line ID object containing the textual or numerical name of the line, which the public knows it by. A line should consist of a single route or a group of routes.



Key

Bz = Block z
Lx = Line x
Gi = Garage i

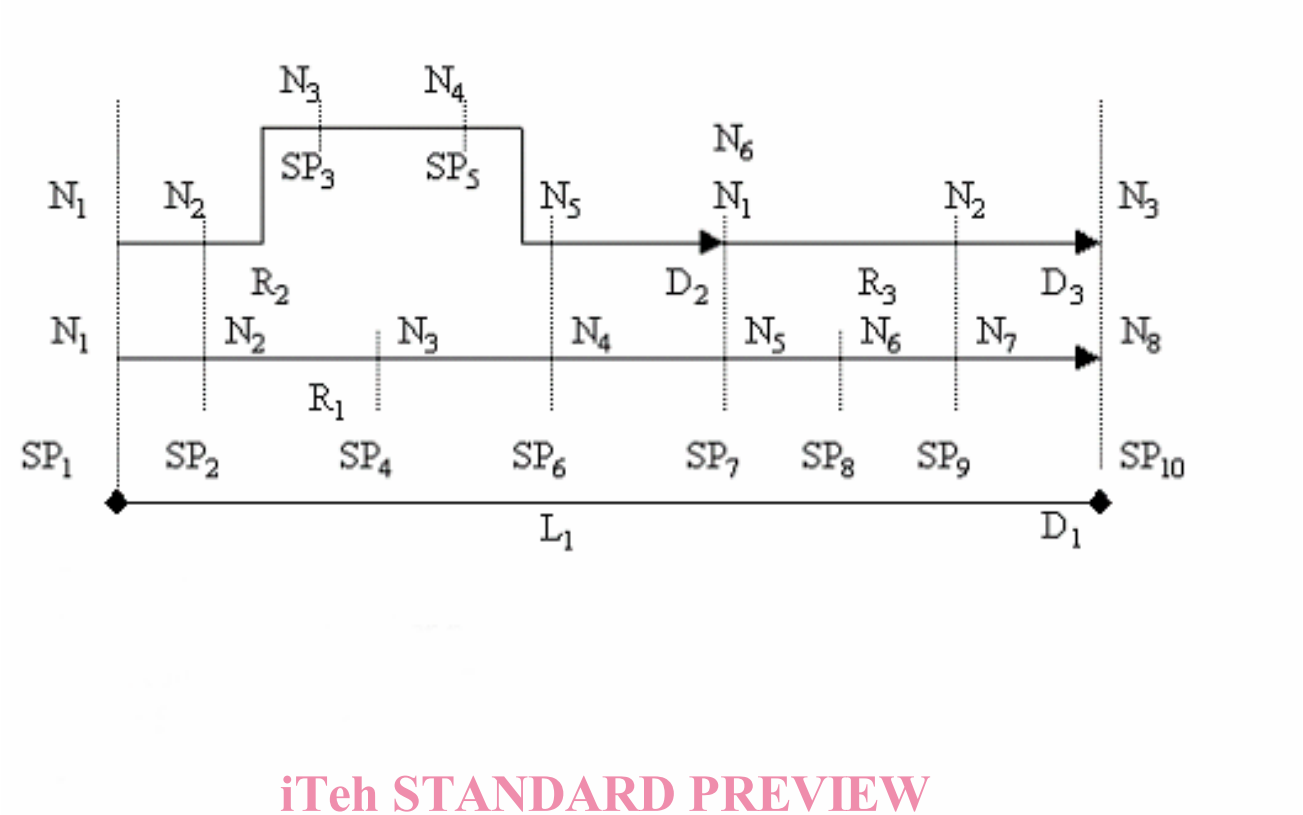
Figure 2 - Non-closed and closed block

A route is an ordered list of points defining one single path through the road (or rail) network. Stop points, timing points and points of other types should be used to define this path uniquely. The route number is related to a line (see Figure 3).

The Stop Point ID assigned by the system designer refers to the Stop Point ID object representing uniquely a stop point within a transportation network (see Figure 3).

The Destination Number is the reference to the route destination. The number can differ from Stop Point ID (see Figure 3).

The number of running in route representation is the Running Stop Point Number within a route (see Figure 3).

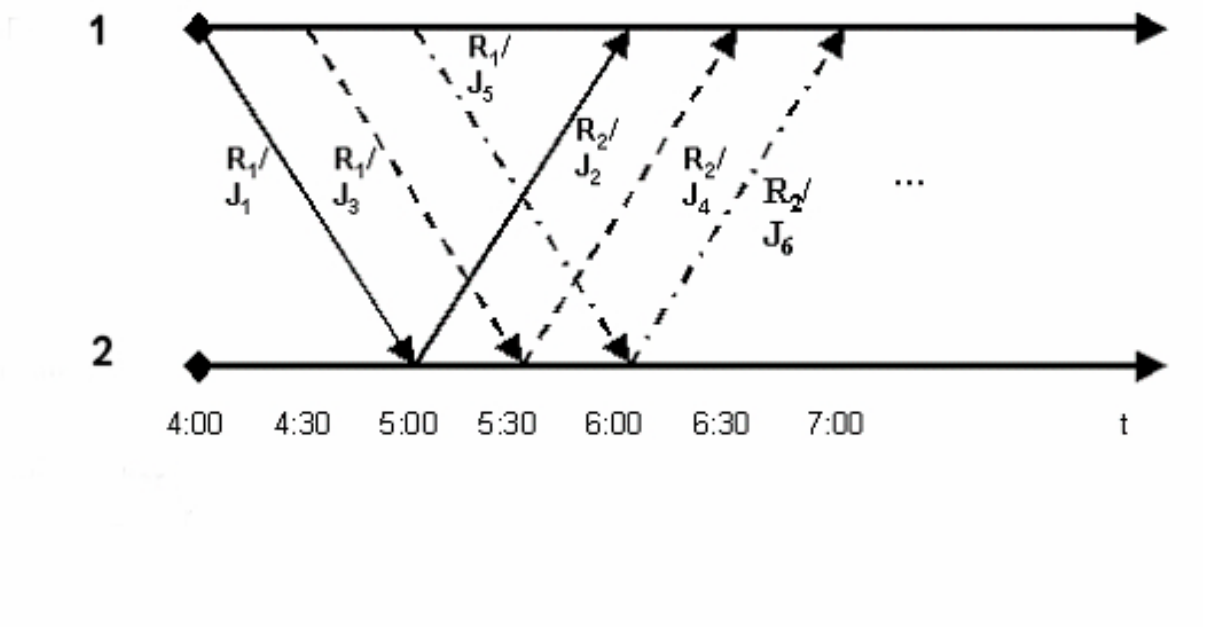


Key

L_i Line i
D_n Destination number n
R_x Route number x in Line i
SP_y = Stop Point Identifier y
N_z = running Stop Point Number z in the route

Figure 3 - Definition of a line

The Journey Number refers to a journey (between one terminus to another terminus) related to a given time or time table (see Figure 4).

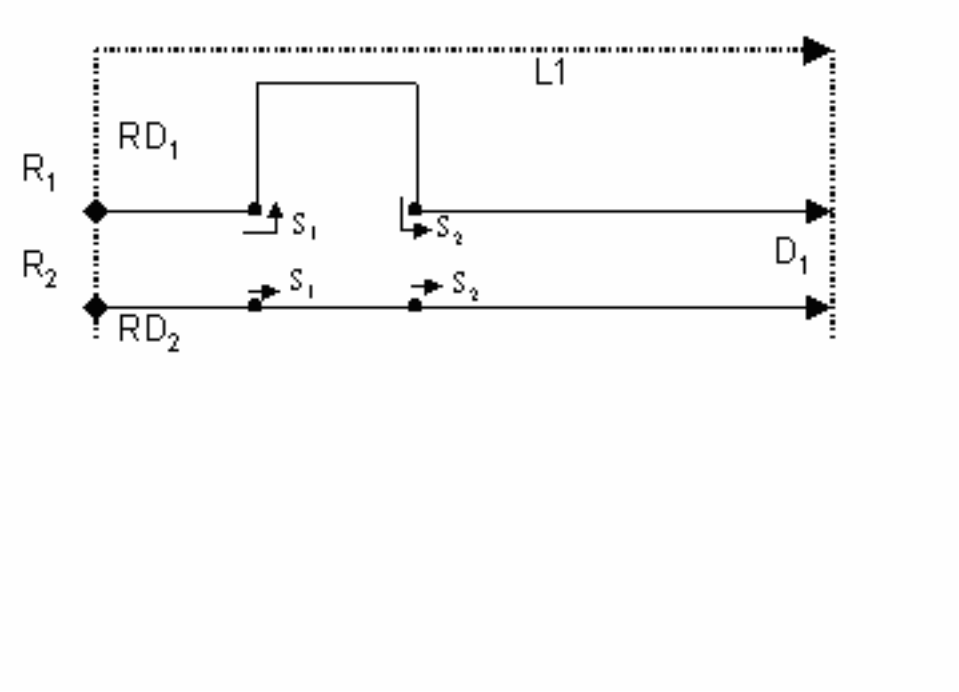


Key

R_i = route number
J_i = journey number
t = time
1 Departure
2 Terminus

Figure 4 - Definition of a journey

The Route Destination ID identifies a unique route and line. With this identifier the path and the rail track of this line/route is defined for a vehicle. For example, this is used for the controlling of rail switches in the track (see Figure 5).



Key

L_x = Line ID x
R_i = Route number I
D_j = Destination number

RD_n = Route destination ID

Figure 5 - Description of the use of Route Destination ID

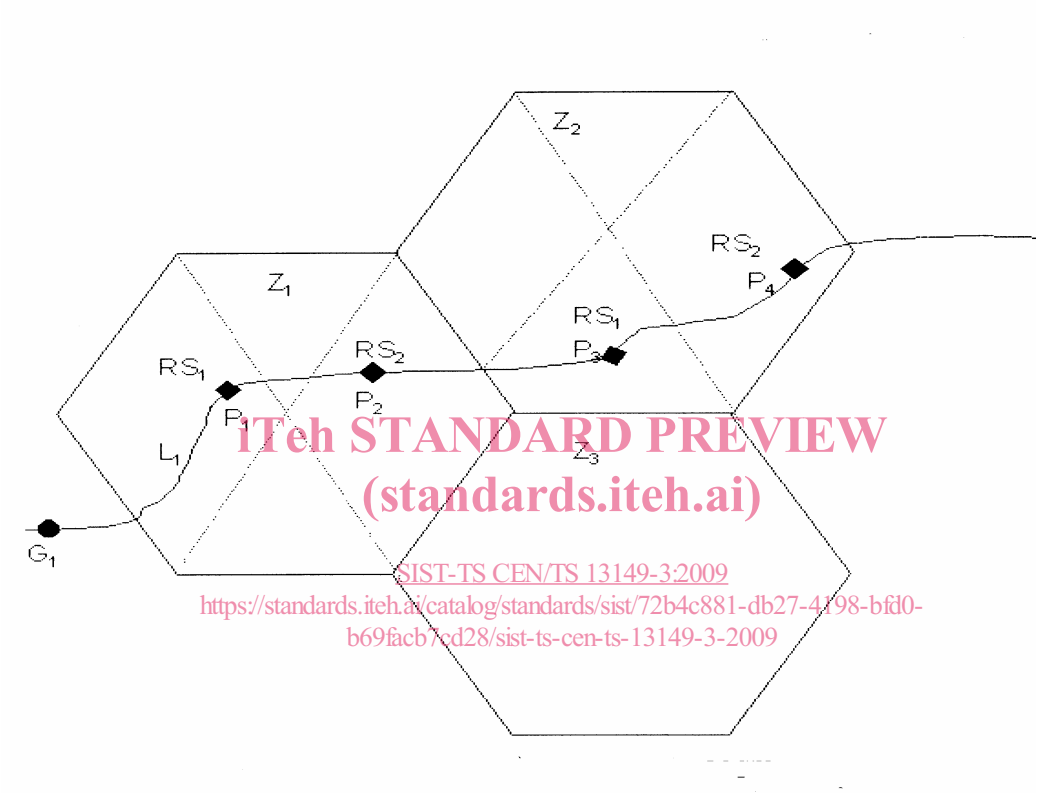
4.3 Fare terms and related identifiers and numbers

The Route Segment Number indicates a set of consecutive links on a given route and is unique for a fare zone (see Figure 6).

The fare zone indicates the current Fare Zone Number (see Figure 6).

The Previous Fare Zone Number indicates the number of the last/previous crossed fare zone (see Table 1).

The Previous Route Segment Number is the number of the last/previous crossed route segment (see Table 1).



Key

G_i = Garage i
L_j = Line j
Z_n = Fare zone n
RS_x = Route segment x
P_z = Vehicle position z

Figure 6 - Fare terms and related identifiers and numbers

Table 1 - Contents of the objects at the different vehicle positions

Positions	P_1	P_2	P_3	P_4
Fare zone	Z_1	Z_1	Z_2	Z_2
Route segment	RS_1	RS_2	RS_1	RS_2
Previous fare zone	-	-	Z_1	Z_1
Previous route segment	-	RS_1	RS_2	RS_1

NOTE In this document, a Fare Stage Number is a stop point on a route beyond which an increment in the fare value occurs.

5 Requirements

5.1 Hardware preferences

There is a WorldFip convention to characterise standard physical device profiles that contain specific applications and virtual devices, but this is beyond the present scope of this part of the standard. The aim here is to define the physical layer and data object dictionary to enable the interoperability of physical devices (Stations) on a vehicle WorldFip LAN. This specification deals essentially with the Transport Process Data Units (TPDU) which is elsewhere referred to as Exchange Blocks (Annex A). The Applications Process Data Units (APDU) also referred to in Annex A as Function Blocks, are not hereafter defined even though they contribute to the Transport Process Data Units.

5.2 Devices in a complex network

The following illustrates the possible devices in a complex network.

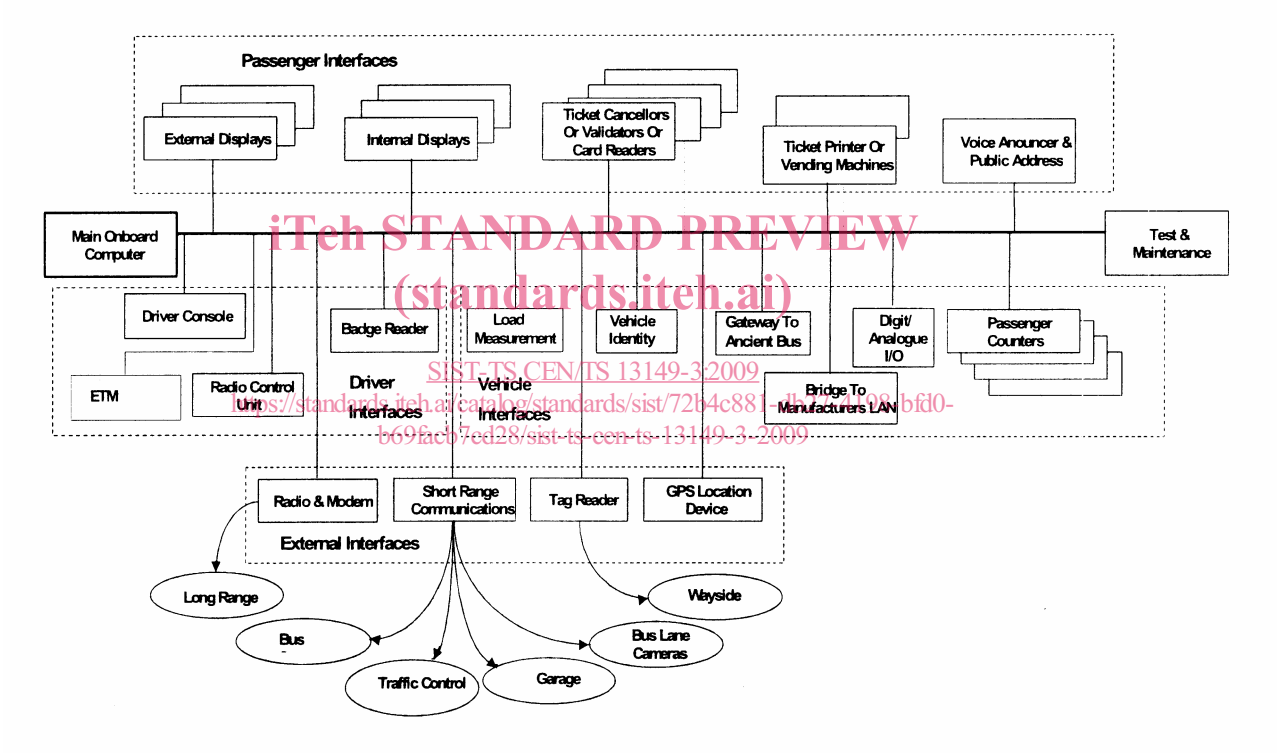


Figure 7 - Devices in a complex network

5.3 Station numbers

Station numbers are given in Table 2.

Table 2 — Station numbers

Number	Station
00H	Test and Maintenance Device
01H	Master On-Board Processor
02H	Spare
03H	Spare
04H	Electronic Ticket Machine
05H	Drivers Console
06H	Badge Reader
07H	Tag/Beacon Reader
08H	Short Range Communications
09H	Radio Control Unit
0AH	Data Modem
0BH	On-Board Display 1
OCH	On-Board Display 2
ODH	On-Board Display 3
0EH	On-Board Display 4
0FH	External Sign (Front)
10H	External Sign (Rear)
11H	External Sign (Side/Kerb)
12H	GPS
13H	Ticket Canceller
14H	Ticket Canceller
15H	Ticket Canceller
16H	Ticket Canceller
17H	Ticket Printer
18H	Ticket Printer
19H	Vehicle Identity
1AH	Voice Announcer/Public Address Audio Unit
1BH	Passenger Counter
1CH	Passenger Counter
1DH	Passenger Counter
1EH	Passenger Counter
1FH	Load Measurement
20H	NOT AVAILABLE
21H	Digital I/O –Vehicles Sensors (Doors etc.)
22H	Gateway to Ancient Data Bus
23H	Gateway to Manufacturer's Data Bus
24H	Bus Lane Enforcement Camera

5.4 Bus arbiter modes

The applications can run with different bus arbiter modes that are defined as follows.

Mode	Function
Test	Out of service network testing or configuration for network management using a Test and Maintenance Device which assumes master bus arbiter when attached to the network
Service	Normal operation is for the master bus arbiter to provide for full service functions including clock
Fallback service	Sub-master for reduced service functionality if master fails.

5.5 Physical layer

5.5.1 General

The definitions given in EN 13149-1 and EN 13149-2 shall be used in WorldFIP networks for devices compliant to this application.

5.5.2 Bit rates.

See EN 13149-1.

5.5.3 Bus connector

See EN 13149-2.

5.5.4 Bus cable

See EN 13149-2.

5.6 Data modelling

5.6.1 General

This part explains the terms that are used in the later tables to characterise the individual data units.

INDEX – A four digit hexadecimal number assigned by system management services for addressing and these can be related to the station address.

TITLE – A short meaningful description.

FUNCTION – A more complete description of the purpose and function. When the data is of a complex and structured then special values are inserted in the Data Tables.

NAME – A meaningful abbreviation of the title directly related to the index and assigned by the programmer to simplify coding.

TPDU TYPE – Transport Process Data Unit Types are.

Periodic	Aperiodic
Variables	Variables
Messages – Acknowledged	Messages – Acknowledged
Messages – Unacknowledged	Messages – Unacknowledged