

AS/NZS 62386.104:2020



Australian/New Zealand Standard™

# Digital addressable lighting interface

**Part 104: General requirements — Wireless and alternative wired system components (IEC 62386-104:2019 (ED. 1.0) MOD)**



AS/NZS 62386.104:2020

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee EL-041, Lamps and Related Equipment. It was approved on behalf of the Council of Standards Australia on 4 November 2020 and by the New Zealand Standards Approval Board on 4 November 2020.

This Standard was published on 20 November 2020.

The following are represented on Committee EL-041:

Australian Industry Group  
Better Regulation Division  
CHOICE  
Consumer Electronics Suppliers Association  
Consumers' Federation of Australia  
Department of Industry, Science, Energy and Resources  
Electrical Compliance Testing Association of Australia  
Electrical Regulatory Authorities Council  
Energy Efficiency & Conservation Authority of New Zealand  
IES: The Lighting Society  
Joint Accreditation System of Australia and New Zealand  
Joint Accreditation System of Australia and New Zealand — New Zealand  
Lighting Council Australia  
Lighting Council New Zealand  
Master Electricians Australia  
Master Electricians NZ  
WorkSafe New Zealand

This Standard was issued in draft form for comment as DR AS/NZS 62386.104:2020.

### **Keeping Standards up-to-date**

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

[www.standards.org.au](http://www.standards.org.au)

[www.standards.govt.nz](http://www.standards.govt.nz)

ISBN 978 1 76113 062 5

Australian/New Zealand Standard™

# Digital addressable lighting interface

**Part 104: General requirements — Wireless  
and alternative wired system components (IEC  
62386-104:2019 (ED. 1.0) MOD)**

First published as AS/NZS 62386.104:2020.



© IEC 2020 — All rights reserved

© Standards Australia Limited/the Crown in right of New Zealand, administered by the New Zealand Standards Executive 2020

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth) or the Copyright Act 1994 (New Zealand).

## Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-041, Lamps and Related Equipment.

The objective of this document is to specify a bus system for control by digital signals of electronic lighting equipment. This document applies to a system with wireless or alternative wired communication between its units, instead of a wired bus system, where the meaning of “wireless or alternative wired communication”, or in short “telecommunication”, is any type of communication network different from the wired system described in AS/NZS 62386.101.

This document is an adoption with national modifications, and has been reproduced from, IEC 62386-104:2019 (ED. 1.0), *Digital addressable lighting interface — Part 104: General requirements — Wireless and alternative wired system components*. The modifications are additional requirements and are set out in [Appendix ZZ](#), which has been added at the end of the source text.

[Appendix ZZ](#) lists the variations to IEC 62386-104:2019 (ED. 1.0), for the application of this document in Australia and New Zealand.

As this document has been reproduced from an International Standard, the following applies:

- (a) In the source text “the IEC 62386 series” and “this part of IEC 62386” should read “this document”.
- (b) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

## NOTES

## CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	10
2 Normative references .....	10
3 Terms and definitions .....	10
4 General .....	11
4.1 Purpose .....	11
4.2 Version number .....	12
4.3 System structure and architecture.....	12
4.4 System information flow .....	13
4.5 Command types .....	14
4.6 Telecommunication units.....	14
4.6.1 General .....	14
4.6.2 Telecommunication transmitters and receivers in telecommunication units .....	14
4.6.3 Control gear .....	15
4.6.4 Input device.....	15
4.6.5 Single master application controller .....	16
4.6.6 Multi-master application controller .....	16
4.6.7 Sharing an telecommunication interface .....	16
4.7 Power interruptions at telecommunication units.....	16
5 Electrical specification .....	17
6 Telecommunication unit power supply .....	17
7 Transmission protocol structure .....	18
7.1 General.....	18
7.1.1 Frame types .....	18
7.1.2 Transaction type .....	18
7.1.3 Source address .....	18
7.2 Control gear forward frame .....	19
7.2.1 General .....	19
7.2.2 Frame format (control gear forward frame).....	19
7.2.3 Payload (control gear forward frame).....	19
7.3 Control gear backward frame .....	19
7.3.1 General .....	19
7.3.2 Frame format (control gear backward frame) .....	20
7.3.3 Payload (control gear backward frame).....	20
7.4 Control device forward frame .....	21
7.4.1 General .....	21
7.4.2 Frame format (control device forward frame) .....	21
7.4.3 Payload (control device forward frame).....	21
7.5 Control device backward frame .....	22
7.5.1 General .....	22
7.5.2 Frame format (control device backward frame) .....	22
7.5.3 Payload (control device backward frame).....	22
7.6 32-bit forward frame.....	23
7.6.1 General .....	23

7.6.2	Frame format (32-bit forward frame) .....	23
7.6.3	Payload (32-bit forward frame).....	23
7.7	32-bit reply frame.....	24
7.7.1	General .....	24
7.7.2	Frame format (32-bit reply frame) .....	24
7.7.3	Payload (32-bit reply frame) .....	24
8	Timing .....	24
9	Method of operation.....	24
9.1	Dealing with frames and commands .....	24
9.2	Collision avoidance, collision detection and collision recovery .....	25
9.3	Transactions .....	25
9.3.1	General .....	25
9.3.2	Transactions of forward frames.....	25
9.3.3	Transactions of backward frames .....	25
9.4	Send-twice forward frames and send-twice commands .....	25
9.5	Command iteration.....	25
9.6	Usage of a shared interface .....	26
9.6.1	General .....	26
9.6.2	Backward frames .....	26
9.6.3	Forward frames .....	26
9.7	Addressing.....	26
9.8	Frame decoding and command execution .....	26
9.8.1	General .....	26
9.8.2	Decoding and execution of control gear forward frames.....	27
9.8.3	Decoding of control gear backward frames .....	27
9.8.4	Decoding and execution of control device forward frames.....	27
9.8.5	Decoding of control device backward frames .....	28
9.8.6	Decoding and execution of 32-bit forward frames .....	28
9.8.7	Decoding and execution of 32-bit backward frames .....	28
9.9	System failure .....	28
10	Declaration of variables .....	28
11	Definition of commands .....	29
11.1	Additional commands for telecommunication control gear .....	29
11.2	Additional commands for telecommunication control devices .....	29
11.3	Configuration instructions .....	30
11.3.1	General .....	30
11.3.2	SET POWER ON DELAY ( <i>DTR0</i> )(telecommunication control gear only) .....	30
11.4	Queries.....	30
11.5	Special commands.....	30
11.5.1	QUERY SYSTEM ADDRESS .....	30
11.5.2	PROGRAM SYSTEM ADDRESS ( <i>data</i> ) .....	31
11.5.3	DELAY SYSTEM FAILURE ( <i>data</i> ).....	31
Annex A (informative)	Examples of telecommunication frames.....	32
A.1	Control gear forward frames.....	32
A.2	Control gear backward frames .....	33
A.3	Control device forward frames .....	34
A.4	Control device backward frames .....	35
Annex B (normative)	Underlying telecommunication protocols .....	38

B.1	General.....	38
B.2	Bluetooth® Mesh .....	38
B.2.1	Overview .....	38
B.2.2	System addresses .....	38
B.2.3	Transactions and frames .....	38
B.2.4	Hardware address .....	39
B.2.5	Receive signal strength indicator (RSSI).....	39
B.2.6	System failure.....	39
B.3	VEmesh™ .....	39
B.3.1	Overview .....	39
B.3.2	System addresses .....	39
B.3.3	Transactions and frames .....	40
B.3.4	Address allocation .....	40
B.3.5	Receive signal strength indicator (RSSI).....	40
B.3.6	System failure detection .....	40
B.4	Distributed PLC bus (DPB).....	40
B.4.1	Overview .....	40
B.4.2	System addresses .....	40
B.4.3	Transactions and frames .....	41
B.4.4	Hardware address .....	41
B.5	User datagram protocol (UDP) .....	41
B.5.1	Overview .....	41
B.5.2	UDP port number.....	41
B.5.3	Forward data packet structure .....	42
B.5.4	Backward data packet structure.....	42
B.5.5	Simple acknowledgement packet structure .....	43
B.5.6	System addresses .....	44
B.5.7	Transactions and frames .....	44
B.5.8	Hardware address .....	44
B.5.9	System failure.....	44
B.5.10	Security .....	45
Annex C (informative)	Example of address allocation.....	46
C.1	Overview.....	46
C.2	Discover all used system addresses .....	46
C.3	Allocate short addresses.....	46
Annex D (informative)	Examples of telecommunication system architectures .....	48
D.1	Single application controller .....	48
D.2	Multiple application controllers .....	48
D.3	Multiple subnets.....	49
Bibliography.....		51
Figure 1 – IEC 62386 graphical overview .....		8
Figure 2 – Telecommunication system structure example .....		13
Figure 3 – Example of communication between telecommunication units .....		14
Figure 4 – Start up timing example .....		17
Figure D.1 – Example of a telecommunication system with a single application controller and control gear .....		48
Figure D.2 – Example of an architecture with multiple application controllers .....		49

Figure D.3 – Example of an architecture with multiple subnets .....	50
Table 1 – System components .....	12
Table 2 – Transmitters and receivers in telecommunication units .....	15
Table 3 – Start-up timing .....	17
Table 4 – Power on timing .....	17
Table 5 – Telecommunication frame types .....	18
Table 6 – Control gear forward frame .....	19
Table 7 – Control gear backward frame .....	19
Table 8 – Control device forward frame .....	21
Table 9 – Control device backward frame .....	22
Table 10 – 32-bit forward frame .....	23
Table 11 – 32-bit reply frame .....	24
Table 12 – Declaration of variables .....	29
Table 13 – Additional commands for telecommunication control gear .....	29
Table 14 – Additional commands for telecommunication control devices .....	29
Table A.1 – Example of control gear forward frame .....	32
Table A.2 – Examples of control gear backward frames .....	33
Table A.3 – Example of control device forward frame .....	34
Table A.4 – Example of control device backward frame .....	35
Table A.5 – Example of control device backward frame (continued) .....	35
Table A.6 – Example of control device backward frame .....	36
Table A.7 – Example of control device backward frame (continued) .....	36
Table B.1 – UDP forward data packet .....	42
Table B.2 – UDP backward data packet .....	42
Table B.3 – ADU error codes .....	43
Table B.4 – UDP simple acknowledge packet .....	43

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL ADDRESSABLE LIGHTING INTERFACE –**  
**Part 104: General requirements –**  
**Wireless and alternative wired system components**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC IEC62386-104 has been prepared by IEC technical committee 34: Lamps and related equipment.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
34/600/FDIS	34/611/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 104 of IEC 62386 is intended to be used in conjunction with:

- Part 101, which contains general requirements for system components;
- Part 102, which contains general requirements for the relevant product type (control gear), and with the appropriate Parts 2xx (particular requirements for control gear);
- Part 103, which contains general requirements for the relevant product type (control devices), and the appropriate Parts 3xx (particular requirements for control devices).

A list of all parts in the IEC 62386 series, published under the general title: *Digital addressable lighting interface*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

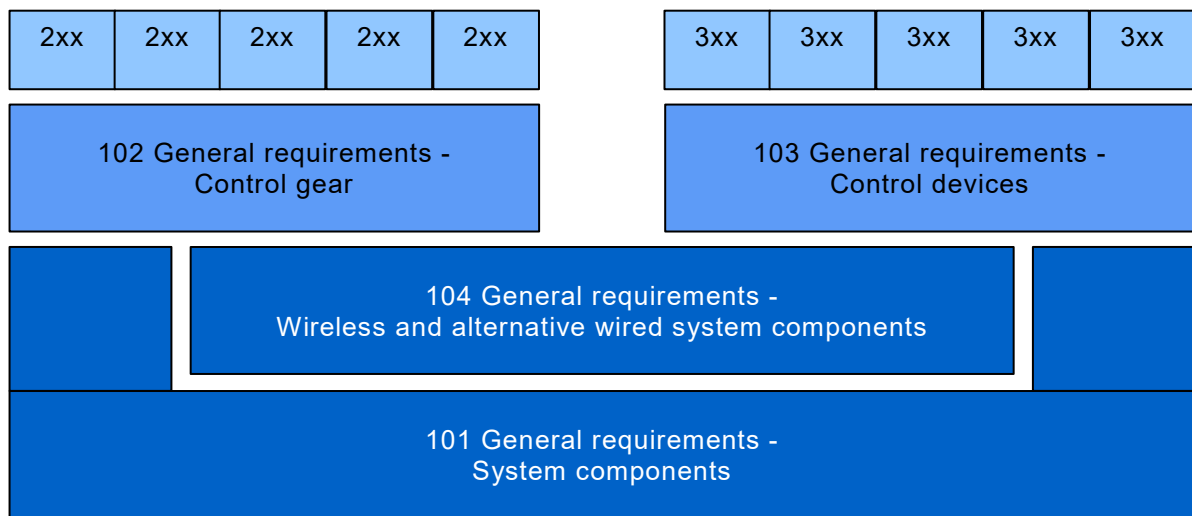
IEC 62386 contains several parts, referred to as series. The IEC 62386-1xx series includes the basic specifications. Part 101 contains general requirements for system components, Part 102 extends this information with general requirements for control gear and Part 103 extends it further with general requirements for control devices.

The IEC 62386-2xx series extends the general requirements for control gear with lamp specific extensions (mainly for backward compatibility with Edition 1 of IEC 62386) and with control gear specific features.

The IEC 62386-3xx series extends the general requirements for control devices with input device specific extensions describing the instance types as well as some common features that can be combined with multiple instance types.

This first edition of IEC 62386-104 is intended to be used in conjunction with IEC 62386-101, IEC 62386-102 and the various parts that make up the IEC 62386-2xx series for control gear, and with IEC 62386-103 and the various parts that make up the IEC 62386-3xx series of particular requirements for control devices. The division into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognised.

The setup of the standards is graphically represented in Figure 1.



IEC

**Figure 1 – IEC 62386 graphical overview**

When this part of IEC 62386 refers to any of the clauses of the other parts of the IEC 62386-1xx series, the extent to which such a clause is applicable and the order in which the tests are to be performed are specified. The other parts also include additional requirements, as necessary.

All numbers used in this document are decimal numbers unless otherwise noted. Hexadecimal numbers are given in the format 0xVV, where VV is the value. Binary numbers are given in the format XXXXXXXXb or in the format XXXX XXXX, where X is 0 or 1; "x" in binary numbers means "don't care".

The following typographic expressions are used:

Variables: “*variableName*” or “*variableName[3:0]*”, giving only bits 3 to 0 of “*variableName*”.

Range of values: [lowest, highest]

Command: “COMMAND NAME”

# DIGITAL ADDRESSABLE LIGHTING INTERFACE –

## Part 104: General requirements –

### Wireless and alternative wired system components

## 1 Scope

The IEC 62386 series specifies a bus system for control by digital signals of electronic lighting equipment. This part of IEC 62386 applies to a system with wireless or alternative wired communication between its units, instead of a wired bus system, where the meaning of “wireless or alternative wired communication”, or in short “telecommunication”, is any type of communication network different from the wired system described in IEC 62386-101.

Where the electronic lighting equipment is covered by the scope of IEC 61347 (all parts), it is in line with the requirements of IEC 61347 (all parts), with the addition of DC supplies.

NOTE the definition of “telecommunication” applies only to this document and differs from the IEC Electropedia term in IEC 60050-701:1988, 701-01-05.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 62386-101:2014, *Digital addressable lighting interface – Part 101: General requirements – System components*  
IEC 62386-101:2014/AMD1:2018

IEC 62386-102:2014, *Digital addressable lighting interface – Part 102: General requirements – Control gear*  
IEC 62386-102:2014/AMD1:2018

IEC 62386-103:2014, *Digital addressable lighting interface – Part 103: General requirements – Control devices*  
IEC 62386-103:2014/AMD1:2018

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62386-101 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>