IEC 62106-10

Edition 1.0 2021-11

INTERNATIONAL STANDARD

Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz – Part 10: UECP – Universal Encoder Communication Protocol

IEC 62106-10:2021-11(en)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC 62106-10

Edition 1.0 2021-11

INTERNATIONAL STANDARD

Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz –
Part 10: UECP – Universal Encoder Communication Protocol

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.060.01; 33.160.20; 33.170

ISBN 978-2-8322-1042-4

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

RADIO DATA SYSTEM (RDS) – VHF/FM SOUND BROADCASTING IN THE FREQUENCY RANGE FROM 64,0 MHz TO 108,0 MHz –

Part 10: UECP – Universal Encoder Communication Protocol

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 62106-10 has been prepared by technical area 1: Terminals for audio, video and data services and content, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This first edition, together with IEC 62106-1, IEC 62106-2, IEC 62106-3, IEC 62106-4, IEC 62106-5, IEC 62106-6 and IEC 62106-9, cancels and replaces IEC 62106:2015, and constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62106:2015:

- The Universal Encoder Communication protocol UECP adapted to support optional RDS2 is new.
- The section dealing with legacy RDS using data-stream 0 only is a transcription of an RDS Forum technical specification which was initially developed by the EBU and which was already in its 7th version [1]. Full backwards compatibility with previous versions was maintained, but RDS features no longer specified in IEC 62106-2 were deleted.

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

Draft	Report on voting
100/3643/FDIS	100/3688/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 62106 series, published under the general title *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz)*, 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 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.

INTRODUCTION

Since the mid-1980s a fascinating development has taken place. Most of the multimedia applications and standards have been created or redefined significantly. Hardware has become extremely powerful with dedicated software and middleware. In the mid-1980s, Internet as well as its protocols did not exist. Navigation systems became affordable in the late 1990s, and a full range of attractive smartphones now exist. The computing power of all these new products is comparable with that of the mainframe installations in that era.

Listener expectations have grown faster than the technology. Visual experience is now very important, like the Internet look and feel. Scrolling text or delivering just audio is nowadays perceived as insufficient for FM radio, specifically for smartphone users. New types of radio receivers with added value features are therefore required. RDS has so far proven to be very successful.

FM radio with RDS is an analogue-digital hybrid system, which is still a valid data transmission technology and only the applications need adaptation. Now the time has come to solve the only disadvantage, the lack of sufficient data capacity. With RDS2, the need to increase the data capacity can be fulfilled.

RDS was introduced in the early 1980s. During the introductory phase in Europe, the car industry became very involved and that was the start of an extremely successful roll-out. Shortly afterwards, RDS (RBDS) was launched in the USA [2, 3, 4, 5, 6].[1]

The RDS Forum has investigated a solution to the issue of limited data capacity. For RDS2, both sidebands around the RDS 57 kHz subcarrier can be repeated a few times, up to three, centred on additional subcarriers higher up in the FM multiplex still remaining compatible with the ITU Recommendations.

The core elements of RDS2 are the additional subcarriers, which will enable a significant increase of RDS data capacity to be achieved, and then only new additional data applications will have to be created, using the RDS-ODA feature, which has been part of the RDS standard IEC 62106 for many years.

In order to update IEC 62106:2015 to the specifications of RDS2, IEC 62106 has been restructured as follows:

Part 1: Modulation characteristics and baseband coding

Part 2: RDS message format, coding and definition of RDS features

Part 3: Usage and registration of Open Data Applications ODAs

Part 4: Registered code tables

Part 5: Marking of RDS and RDS2 devices

Part 6: Compilation of technical specifications for Open Data Applications in the public domain

Part 9: RBDS – RDS variant used in North America

Part 10: Universal Encoder Communication Protocol UECP

NOTE 1 The Part numbers 7 and 8 will not be used.

The original specifications of the RDS system have been maintained and the extra functionalities of RDS2 have been added.

Obsolete or unused functions from the original RDS standard have been deleted.

---

1 Numbers in square brackets refer to the Bibliography.

RADIO DATA SYSTEM (RDS) – VHF/FM SOUND BROADCASTING IN THE FREQUENCY RANGE FROM 64,0 MHz TO 108,0 MHz –

Part 10: UECP – Universal Encoder Communication Protocol

1 Scope

This part of IEC 62106 describes the Universal Encoder Communication Protocol – UECP. The UECP has as its primary objectives to satisfy the need for harmonized RDS encoder communication protocols and to facilitate the interworking of various RDS systems components, such as RDS servers, data bridges and encoders, regardless of the supplier. Furthermore, a harmonised network environment and encoder model is being maintained to facilitate the interchange of component parts of RDS network systems. These harmonized models and a universal layered protocol are specified, based on the ISO/OSI recommendation. The UECP encompasses all current RDS features including any new developments using the ODA protocol.

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 62106-1, *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz – Part 1: Modulation characteristics and baseband coding*

IEC 62106-2:2021, *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz – Part 2: Message format: Coding and definition of RDS features*

IEC 62106-4, *Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz – Part 4: Registered code tables*

ETSI EN 300 401, *Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers*

ETSI TS 101 756, *Digital Audio Broadcasting (DAB); Registered Tables*

ETSI TS 102 980, *Digital Audio Broadcasting (DAB); Dynamic Label Plus (DL Plus); Application specification*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms, definitions and abbreviated terms of IEC 62106-1, of IEC 62106-2 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

3.2 Abbreviated terms

ADD	Destination address bytes (2 bytes)
AS	Assignment signalling (assign channel/pipe to AID) for RDS2
CRC-16	Cyclic Redundancy Check (2 bytes)
DAB	Digital Audio Broadcasting
DL	Dynamic Label (DAB)
DSN	Data Set Number
DVB-S	Digital Video Broadcasting via Satellite
ID	Identification
IP	Internet Protocol
GS	Group sequence
MEC	Message Element Code
MED	Message Element Data
MEL	Message Element data Length
MFL	Message Field Length
MSG	Message bytes
PSN	Programme Service Number
RFT	RDS2 File Transfer protocol
SQC	Sequence counter byte
STA	Start byte
STP	Stop byte
TCP	Transmission Control Protocol used on the Internet
UDP	User Datagram Protocol used on the Internet
UECP	Universal Encoder Communication Protocol

4 RDS encoder hardware model

A simplified model of an RDS encoder with data-stream 0 and three optional upper data-streams 1 – 3 is shown in Figure 1. The model does not include such obvious or necessary components as a power supply or control panel, but includes the blocks necessary to understand and develop the protocol itself.

These blocks are:

- Processor – the central processing unit of the encoder, usually a micro-processor, with access to input and output devices, the real-time clock, and memory.
- Memory – comprises ROM and RAM necessary for the operating software of the encoder, and appropriate RAM, NVRAM, and ROM for stored data.
- Real time clock – maintains the current time of day and calendar date. Used to generate type 4A groups (CT).

- Communication interface – UECP data using this specification is received from an RDS data server of the broadcaster or a transmission operator and transmitted using the serial communications interface. Alternatively, an IP interface may be used. The appropriate IP transmission methods are described in Annex B.
- RDS modulator – produces the RDS bi-phase signal, in accordance with IEC 62106-1.
- 57 kHz subcarrier – frequency and phase locked to the third harmonic of the selected 19 kHz pilot-tone reference source.
- 66,5 kHz subcarrier – frequency and phase locked to the third harmonic of the selected 19 kHz pilot-tone reference source and used to generate data-stream 1.
- 71,25 kHz subcarrier – frequency and phase locked to the third harmonic of the selected 19 kHz pilot-tone reference source and used to generate data-stream 2.
- 76 kHz subcarrier – frequency and phase locked to the third harmonic of the selected 19 kHz pilot-tone reference source and used to generate data-stream 3.
- Reference selector (optional): selects one source of the 19 kHz pilot-tone reference signal, out of a maximum of six, to lock to the internal 57 kHz oscillator. Each 19 kHz reference source corresponds to a specific level and phase adjustment of the produced output signal. When a specific reference source is selected via the Reference selector, the corresponding level and phase values are taken from a "reference entry table". This table comprises the following parameters:RDS output level for each of the data-streams (see IEC 62106-1).
- RDS subcarrier 0 phase relative to the pilot (see IEC 62106-1 for conditions to be met).
- Level and phase control: the level of each subcarrier and phase of subcarrier 0 shall be adjusted by the processor under the appropriate commands (see Annex A). The phase of subcarriers 1, 2, and 3 shall be phase locked to subcarrier 0 (see IEC 62106-1). The output level shall be set in the range 0 mV to 8 191 mV, and the phase in the range between 0° and 360° to lock to the internal 57 kHz oscillator. Level and phase of the RDS signal may depend of the 19 kHz pilot-tone reference signal. As up to six reference inputs may be used, level and phase are set on the "reference table entry", as mentioned under the item "Reference selector" above.

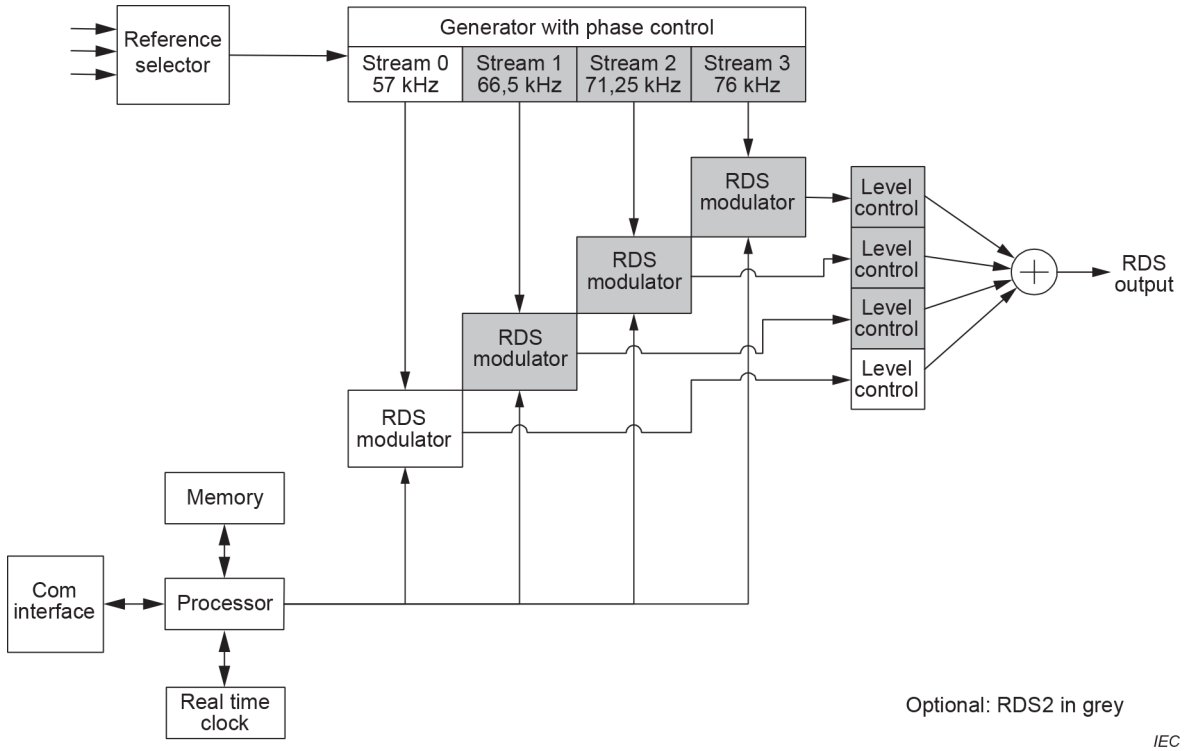

Figure 1 – RDS encoder hardware model

5 RDS encoder software model

The encoder in accordance with the addressing method described in Clause 6 accepts messages, which are detailed in Clause 8. Applicability is further determined by optional fields within the message itself. This permits addressing of the structures shown in Figure 2:

- Data sets: an encoder will have one or more data sets identified by a unique DSN, each of which results in a particular RDS output. Each data set may refer to many programme services using the RDS-EON feature. Only one data set is responsible at any one time for the encoder's output and is known as the current data set. Data sets are addressed by the protocol as described in Clause 8.
- Programme services: all programme services are identified by a unique Programme Service Number PSN which is used to label data within RDS networks. In a network providing the EON feature, data for several programme services will be sent to an encoder, which can then identify that the data refers to one or more of the data sets and elements within the data sets used by that encoder. Programme services are addressed using the PSN by the protocol as described in Clause 8. There is a specific memory area in each data set for each programme service.
- Buffers: some information is buffered, for example ODAs, EWS and other free format groups. This means that the received information is placed in a queue awaiting transmission. It is possible to configure a buffer for cyclic transmission.

On the upper data-streams for RDS2, only C-type groups are used. For A and B type groups on the upper data-streams, C-type tunneling shall be used (see IEC 62106-2).

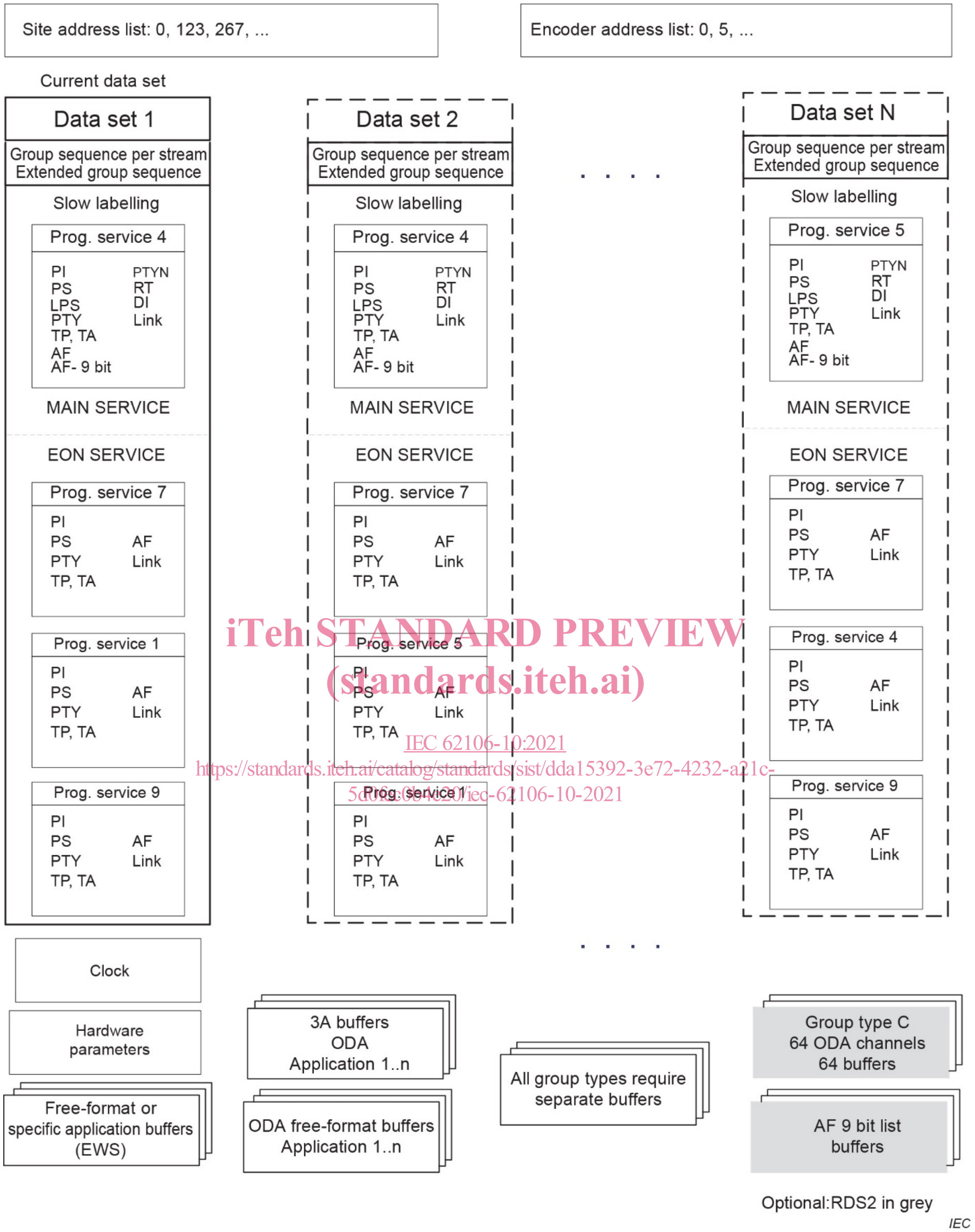

Figure 2 – RDS encoder software model

6 Destination addressing method

6.1 General

Communication to RDS encoders needs to be capable of many levels of addressing: to all encoders, to specific sets of encoders, or to a particular device. This may be accomplished by unique physical connections or by a suitable logical addressing method.