

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Industrial communication networks – Fieldbus specifications –  
Part 4-24: Data-link layer protocol specification – Type 24 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 4-24: Spécification du protocole de la couche liaison de données –  
Éléments de type 24**





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2023 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://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](http://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 It also gives information on projects, replaced and withdrawn publications.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](http://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](http://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](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Discover our powerful search engine and read freely all the publications preview. With a subscription you will always have access to up-to-date content tailored to your needs.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Industrial communication networks – Fieldbus specifications –  
Part 4-24: Data-link layer protocol specification – Type 24 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 4-24: Spécification du protocole de la couche liaison de données –  
Éléments de type 24**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 25.040.40, 35.100.20, 35.110

ISBN 978-2-8322-7774-4

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
1.1 General.....	10
1.2 Specifications .....	10
1.3 Procedures .....	10
1.4 Applicability .....	11
1.5 Conformance .....	11
2 Normative references .....	1
3 Terms, definitions, symbols, abbreviated terms and conventions .....	12
3.1 Reference model terms and definitions .....	12
3.2 Service convention terms and definitions .....	13
3.3 Common terms and definitions.....	13
3.4 Symbols and abbreviations .....	16
3.5 Additional Type 24 symbols and abbreviations.....	16
3.6 Common conventions.....	16
3.7 Additional Type 24 conventions.....	17
3.7.1 Primitive conventions.....	17
3.7.2 State machine conventions.....	17
4 Overview of DL-protocol .....	18
4.1 Characteristic feature of the DL-protocol .....	18
4.2 DL layer component.....	19
4.2.1 Cyclic transmission control (CTC).....	20
4.2.2 Send receive control (SRC) .....	20
4.2.3 DL-management .....	20
4.3 Timing sequence.....	20
4.3.1 Overview .....	20
4.3.2 Cyclic transmission mode .....	20
4.3.3 Acyclic transmission mode.....	34
4.4 Service assumed on the PhL.....	34
4.4.1 General requirement.....	34
4.4.2 DL_Symbols .....	34
4.4.3 Assumed primitives of the PhS .....	35
4.5 Local parameters, variables, counters, timers .....	35
4.5.1 Overview .....	35
4.5.2 Variables, parameters, counters and timers to support DLE function.....	35
5 DL PDU structure .....	40
5.1 Overview.....	40
5.1.1 Transfer syntax for bit sequences .....	40
5.1.2 Data type encodings .....	41
5.1.3 Frame format.....	41
5.2 Basic format DLPDU structure .....	41
5.2.1 General .....	41
5.2.2 Synchronous frame.....	45
5.2.3 Output data or Input data frame .....	46
5.2.4 Delay measurement start frame .....	46

5.2.5	Delay measurement frame .....	47
5.2.6	Message token frame .....	47
5.2.7	Status frame .....	48
5.2.8	Cycle Information frame .....	49
5.2.9	Message frame .....	50
5.3	Short format DLPDU structure .....	51
5.3.1	General .....	51
5.3.2	Synchronous frame .....	53
5.3.3	Output data or Input data frame .....	53
5.3.4	Message frame .....	54
5.4	Short format II DLPDU structure .....	54
5.4.1	General .....	54
5.4.2	Asynchronous frame .....	56
5.4.3	Synchronous frame .....	57
5.4.4	Output data or Input data frame .....	57
6	DLE element procedure .....	58
6.1	Overview .....	58
6.2	Cyclic transmission control sublayer .....	58
6.2.1	General .....	58
6.2.2	DLS-user interface .....	58
6.2.3	Protocol machines in CTC .....	59
6.2.4	CTC-DLM interface .....	112
6.3	Send Receive Control .....	113
6.3.1	General .....	113
6.3.2	SRC-CTC interface .....	114
6.3.3	Detailed specification of SRC .....	114
6.3.4	SRC-DLM interface .....	119
7	DL-management layer (DLM) .....	120
7.1	Overview .....	120
7.2	Primitive definitions .....	120
7.2.1	Primitives exchanged between DLMS-user and DLM .....	120
7.2.2	Parameters used with DLM primitives .....	121
7.3	DLM protocol machine .....	121
7.3.1	C1 master .....	121
7.3.2	Slave and C2 master .....	126
7.4	Functions .....	130
7.5	DLM protocol machine for no time slot type .....	131
7.5.1	C1 master .....	131
7.5.2	C2 master and Slave .....	133
7.6	Functions for no time slot type .....	134
	Bibliography .....	135
	Figure 1 – Data-link layer component .....	20
	Figure 2 – Timing chart of fixed-width time slot type cyclic communication .....	21
	Figure 3 – Timing chart of configurable time slot type cyclic communication .....	23
	Figure 4 – Schematic diagram of cyclic event occurrence .....	25
	Figure 5 – Timing relationship between cyclic transmission and data processing .....	28

Figure 6 – Timing chart of no time slot type cyclic communication (Master send common address) .....	28
Figure 7 – Timing chart for multiple transmission cycle setting .....	29
Figure 8 – Timing chart for multiple transmission cycle setting figure title .....	30
Figure 9 – Schematic diagram for connection.....	31
Figure 10 – Schematic diagram of INPUT data response timing at the same interval .....	32
Figure 11 – Schematic diagram of INPUT data response timing at the same time .....	33
Figure 12 – Timing chart example of acyclic communication .....	34
Figure 13 – Basic format DLPDU structure.....	42
Figure 14 – Short format DLPDU structure.....	51
Figure 15 – Short format II DLPDU structure.....	54
Figure 16 – Acyclic transmission frame address field .....	55
Figure 17 – Cyclic transmission frame address .....	55
Figure 18 – Asynchronous frame .....	56
Figure 19 – Synchronous frame (to be used by C1).....	57
Figure 20 – Synchronous frame (to be used by C2 or slave) .....	57
Figure 21 – The state diagram of the C1 master for fixed-width time slot .....	60
Figure 22 – The state diagram of the C2 master for fixed-width time slot .....	67
Figure 23 – The state diagram of the slave for fixed-width time slot .....	71
Figure 24 – The state diagram of the C1 master for configurable time slot .....	73
Figure 25 – The state diagram of the C2 master for configurable time slot .....	82
Figure 26 – The state diagram of slave for configurable time slot.....	85
Figure 27 – The state diagram of the C1 master for no time slot type.....	89
Figure 28 – The state diagram of the C2 master for no time slot type.....	90
Figure 29 – The state diagram of the Slave for no time slot type .....	92
Figure 30 – The state diagram of message initiator for basic format.....	93
Figure 31 – The state diagram of message responder for basic format.....	97
Figure 32 – The state diagram of message initiator for short format.....	101
Figure 33 – The state diagram of message responder for short format.....	106
Figure 34 – The state diagram of the acyclic transmission protocol machine .....	111
Figure 35 – Internal architecture of one-port SRC .....	115
Figure 36 – Internal architecture of multi-port SRC .....	115
Figure 37 – Internal architecture of serializer .....	115
Figure 38 – Internal architecture of deserializer .....	117
Figure 39 – State diagram of the C1 master DLM.....	122
Figure 40 – State diagram of the Slave and the C2 master DLM .....	127
Figure 41 – State diagram of the C1 master DLM for no time slot type.....	132
Figure 42 – State diagram of the C2 master and slaves DLM for no time slot type .....	133
Table 1 – State transition descriptions .....	18
Table 2 – Description of state machine elements .....	18
Table 3 – Conventions used in state machines .....	18
Table 4 – Characteristic features of the fieldbus data-link protocol.....	19

Table 5 – List of the values of the variable Cyc_sel.....	36
Table 6 – List of the values of the variable Tunit.....	37
Table 7 – List of the values of the variable PDUType.....	38
Table 8 – List of the values of the variable SlotType.....	38
Table 9 – Transfer syntax for bit sequences.....	40
Table 10 – Bit order.....	41
Table 11 – Destination and source address format.....	42
Table 12 – Station address.....	42
Table 13 – Extended address.....	43
Table 14 – Message control field format (Information transfer format).....	43
Table 15 – Message control field format (Supervisory format).....	44
Table 16 – The list of Supervisory function bits.....	44
Table 17 – Frame type and data length format.....	44
Table 18 – The list of Frame type.....	45
Table 19 – Data format of the Synchronous frame.....	45
Table 20 – The field list of the Synchronous frame.....	46
Table 21 – Data format of the Output data or the Input data frame.....	46
Table 22 – The field list of the Output data or the Input data frame.....	46
Table 23 – Data format of Delay measurement start frame.....	47
Table 24 – The field list of Delay measurement start frame.....	47
Table 25 – Data format of Delay measurement frame.....	47
Table 26 – The field list of Delay measurement frame.....	47
Table 27 – Data format of Status frame.....	48
Table 28 – The field list of Status frame.....	48
Table 29 – The list of the DLE status.....	48
Table 30 – The list of Repeater status.....	49
Table 31 – Data format of Delay measurement frame.....	49
Table 32 – The field list of Cycle Information frame.....	50
Table 33 – Data format of Message frame.....	50
Table 34 – The field list of Message frame.....	50
Table 35 – Range of Station address field.....	51
Table 36 – Control field format (I/O data exchange format).....	52
Table 37 – Control field format (Message format).....	52
Table 38 – The field list of Message format.....	52
Table 39 – Data format of the Synchronous frame.....	53
Table 40 – The field list of the Synchronous frame.....	53
Table 41 – Data format of the Output data frame.....	53
Table 42 – The field list of the Output data frame.....	54
Table 43 – Data format of the Input data frame.....	54
Table 44 – The field list of the Input data frame.....	54
Table 45 – Range of Station address field.....	55
Table 46 – Cycle scale counter field format.....	56
Table 47 – The list of frame type.....	56

Table 48 – Data format of the Output data frame .....	57
Table 49 – The field list of the Output data frame .....	57
Table 50 – Data format of the Input data frame .....	57
Table 51 – The field list of the Input data frame .....	58
Table 52 – Primitives and parameters for the DLS-user interface issued by the DLS-user .....	58
Table 53 – Primitives and parameters for the DLS-user interface issued by the CTC .....	59
Table 54 – The state table of the C1 master for fixed-width time slot.....	61
Table 55 – The state table of the C2 master for fixed-width time slot.....	67
Table 56 – The state table of the slave for fixed-width time slot .....	71
Table 57 – The state table of the C1 master for configurable time slot .....	74
Table 58 – The state table of the C2 master for configurable time slot .....	82
Table 59 – The state table of slave for configurable time slot .....	86
Table 60 – The list of functions used by cyclic transmission machine.....	87
Table 61 – The state table of the C1 master for no time slot type .....	90
Table 62 – The state table of the C2 master for no time slot type .....	91
Table 63 – The state table of the Slave for no time slot type .....	92
Table 64 – The state table of message initiator for basic format .....	94
Table 65 – The state table of message responder for basic format .....	98
Table 66 – The state table of message initiator for short format .....	102
Table 67 – The state table of message responder for short format .....	106
Table 68 – List of functions used by the message implementation machine .....	110
Table 69 – The state table of the acyclic transmission protocol machine .....	112
Table 70 – The list of functions used acyclic transmission protocol machine .....	112
Table 71 – Primitives and parameters exchanged between CTC and DLM .....	113
Table 72 – Error event primitive and parameters .....	113
Table 73 – primitives and parameters for SRC-CTC interface .....	114
Table 74 – Send frame primitive and parameters .....	114
Table 75 – Receive frame primitives and parameters .....	114
Table 76 – Primitives and parameters exchanged between SRC and DLM .....	119
Table 77 – Get value primitive and parameters .....	120
Table 78 – Error event primitive and parameters .....	120
Table 79 – The list of primitives and parameters (DLMS-user source).....	121
Table 80 – The list of primitives and parameters (DLM source) .....	121
Table 81 – State table of the C1 Master DLM.....	122
Table 82 – State table of the Slave and the C2 master DLM .....	127
Table 83 – The list of the functions used by DLM protocol machine .....	130
Table 84 – State table of the C1 Master DLM for no time slot type .....	132
Table 85 – State table of the C2 master and slaves DLM for no time slot type .....	133

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELDBUS SPECIFICATIONS –****Part 4-24: Data-link layer protocol specification –  
Type 24 elements**

## 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, accept 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 informative 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.

Attention is drawn to the fact that the use of the associated protocol type is restricted by its intellectual-property-right holders. In all cases, the commitment to limited release of intellectual-property rights made by the holders of those rights permits a layer protocol type to be used with other layer protocols of the same type, or in other type combinations explicitly authorized by its intellectual-property-right holders.

NOTE – Combinations of protocol types are specified in the IEC 61784-1 series and the IEC 61784-2 series.

IEC 61158-4-24 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- addition of a new cyclic transmission mode which called "no time slot type" in Subclause 4.3.2.4;
- addition of a new frame format for no time slot type in Subclause 5.4;
- addition of a new DLE element procedure for no time slot type in Subclause 6.2.3.2.4, 6.3.3.2.2.4, 6.3.3.3.2.4;
- addition of a new DLM protocol machine for no time slot type in Subclause 7.5, 7.6; and
- spelling and grammar.

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

Draft	Report on voting
65C/1202/FDIS	65C/1243/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

A list of all parts of the IEC 61158 series, under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC web site.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC web site under [webstore.iec.ch](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.

## INTRODUCTION

This part of IEC 61158 is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the "three-layer" fieldbus reference model described in IEC 61158-1.

The data-link protocol provides the data-link service by making use of the services available from the physical layer. The primary aim of this document is to provide a set of rules for communication expressed in terms of the procedures to be carried out by peer data-link entities (DLEs) at the time of communication. These rules for communication are intended to provide a sound basis for development in order to serve a variety of purposes:

- as a guide for implementers and designers;
- for use in the testing and procurement of equipment;
- as part of an agreement for the admittance of systems into the open systems environment;
- as a refinement to the understanding of time-critical communications within OSI.

This document is concerned, in particular, with the communication and interworking of sensors, effectors and other automation devices. By using this document together with other standards positioned within the OSI or fieldbus reference models, otherwise incompatible systems could work together in any combination.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent. IEC takes no position concerning the evidence, validity, and scope of this patent right.

The holder of this patent right has assured IEC that s/he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from the patent database available at [patents.iec.ch](https://patents.iec.ch).

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

## INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

### Part 4-24: Data-link layer protocol specification – Type 24 elements

#### 1 Scope

##### 1.1 General

The data-link layer provides basic time-critical messaging communications between devices in an automation environment.

This protocol provides communication opportunities to all participating data-link entities:

- in a synchronously-starting cyclic manner, according to a pre-established schedule, or
- in an acyclic manner, as requested by each of those data-link entities.

Thus, this protocol can be characterized as one which provides cyclic and acyclic access asynchronously but with a synchronous restart of each cycle.

##### 1.2 Specifications

This part of IEC 61158 provides specifies

- procedures for the timely transfer of data and control information from one data-link user entity to a peer user entity, and among the data-link entities forming the distributed datalink service provider;
- procedures for giving communications opportunities to all participating DL-entities (DLEs), sequentially and in a cyclic manner for deterministic and synchronized transfer at cyclic intervals up to 64 ms;
- procedures for giving communication opportunities available for time-critical data transmission together with non-time-critical data transmission without prejudice to the time-critical data transmission;
- procedures for giving cyclic and acyclic communication opportunities for time-critical data transmission with prioritized access;
- procedures for giving communication opportunities based on ISO/IEC/IEEE 8802-3 medium access control, with provisions for nodes to be added or removed during normal operation;
- the structure of the fieldbus DLPDUs used for the transfer of data and control information by the protocol of this document, and their representation as physical interface data units.

##### 1.3 Procedures

The procedures are defined in terms of

- the interactions between peer DL-entities through the exchange of fieldbus DLPDUs;
- the interactions between a DL-service (DLS) provider and a DLS-user in the same system through the exchange of DLS primitives;
- the interactions between a DLS-provider and a Ph-service provider in the same system through the exchange of Ph-service primitives.