# ETSI TS 101 761-5 V1.2.1 (2001-12)
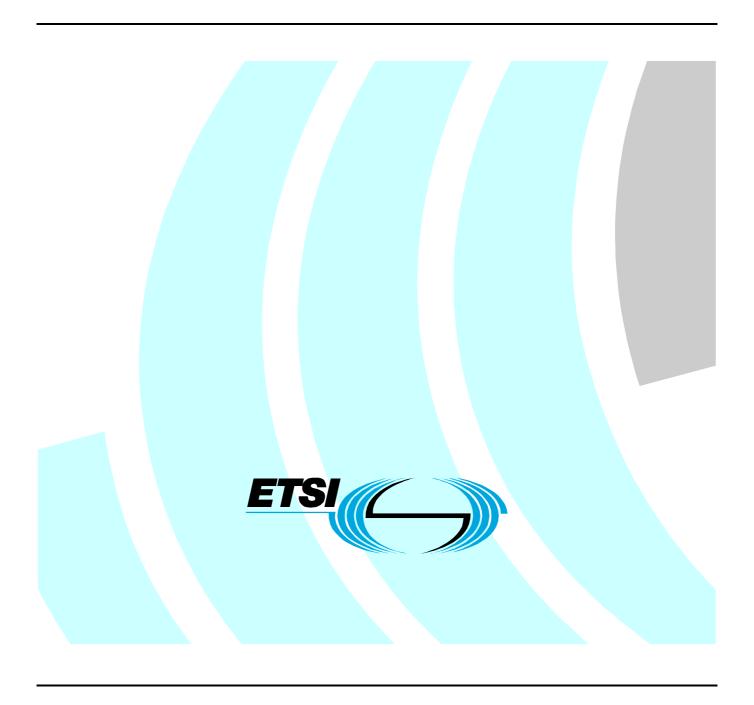
**Broadband Radio Access Networks (BRAN);
HIPERLAN Type 2;
Data Link Control (DLC) Layer;
Part 5: Profile for Home Environment**

**ETSI**

Reference

RTS/BRAN-0020004-5R1

Keywords

access, layer 2, HIPERLAN, broadband, radio,
LAN, IP

*ETSI*

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

*Important notice*

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or
perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF).
In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive
within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, send your comment to:
editor@etsi.fr

*Copyright Notification*

*ETSI*

# Contents

# Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

# Foreword

This Technical Specification (TS) has been produced by ETSI Project Broadband Radio Access Networks (BRAN).

The present document is part 5 of a multi-part deliverable covering the Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Data Link Control (DLC) Layer, as identified below:

Part 1:     "Basic Data Transport Functions";

Part 2:     "Radio Link Control (RLC) sublayer";

Part 3:     "Profile for Business Environment";

Part 4:     "Extension for Home Environment";

**Part 5:     "Profile for Home Environment".**

# Introduction

The present document is a profile document, pointing at functions in the referenced HIPERLAN/2 documents.

The following HIPERLAN/2 documents shall be supported:

- Physical (PHY) layer (TS 101 475 [7]);

- Data Link Control (DLC) Layer (TS 101 761):

    - Part 1:     Basic Data Transport Functions [1];

    - Part 2:     Radio Link Control (RLC) sublayer [2];

    - Part 4:     Extension for Home Environment [3].

- Packet based Convergence Layer (TS 101 493):

    - Part 1:     Common Part [4].

If a function is mandatory in a referenced document, it is also mandatory in the present document. If a function is optional in a referenced document, it may still be optional in the present document. In that case, nothing further is written in the present document. If a function is optional in a referenced document, it can be made mandatory in the present document. In these cases, it is clearly stated in the present document that the function has become mandatory. The words "mandatory" and "optional" in the present document always mean that it is mandatory or optional to implement a function.

Depending on the application either:

- Part 3: IEEE 1394 Service Specific Convergence Sublayer (SSCS) [5];

- Part 4: IEEE 1394 Bridge layer; Phase 1 [6]; or

- Part 2: Ethernet Service Specific Convergence Sublayer (SSCS) [8];

or both shall be supported.

# 1　Scope

The present document specifies the interoperability functions needed for a home environment. It contains functions of the Data Link Control Layer [1], the Radio Link Control sublayer [2], the DLC Extension for Home Environment [3], the Packet based Convergence Layer [4] and [5], the Bridge layer [6] and the Physical layer specifications [7] of HIPERLAN/2. It does not contain interoperability functions for communication over the fixed network.

The present document is a profile document, selecting functions from the HIPERLAN/2 specifications of the reference list. It is also a document survey since it refers to versions of the basic specifications and since the version number of the present document is negotiated during association.

A home environment is characterized by the following properties for the present document:

- The home network is an ad hoc network.

- It may include fixed networks like IEEE 1394 busses.

- In the case of IEEE 1394 data traffic includes asynchronous and isochronous packets.

# 2　References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

[1]　　　　ETSI TS 101 761-1 (V1.2.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Data Link Control (DLC) Layer; Part 1: Basic Data Transport Functions".

[2]　　　　ETSI TS 101 761-2 (V1.2.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Data Link Control (DLC) Layer; Part 2: Radio Link Control (RLC) sublayer".

[3]　　　　ETSI TS 101 761-4 (V1.2.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Data Link Control (DLC) Layer; Part 4: Extension for Home Environment".

[4]　　　　ETSI TS 101 493-1 (V1.1.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based Convergence Layer; Part 1: Common Part".

[5]　　　　ETSI TS 101 493-3 (V1.1.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based convergence Layer; Part 3: IEEE 1394 Service Specific Convergence Sublayer (SSCS)".

[6]　　　　ETSI TS 101 493-4 (V1.1.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based Convergence Layer; Part 4: IEEE 1394 Bridge Specific Functions sub-layer for restricted topology".

[7]　　　　ETSI TS 101 475 (V1.2.2): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Physical (PHY) layer".

[8]　　　　ETSI TS 101 493-2 (V1.1.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based Convergence Layer; Part 2: Ethernet Service Specific Convergence Sublayer (SSCS)".

# 3        Symbols and abbreviations

## 3.1      Symbols

For the purposes of the present document, the following symbols apply:

M                    entity that is optional in referenced document but that has been made mandatory in the present
                     document
(M)                  entity that is mandatory in referenced document. Used for cases that need clarification
(O)                  entity that is optional in referenced document and is still optional in the present document. Used
                     for cases that need clarification

## 3.2      Abbreviations

For the purposes of the present document, the following abbreviations apply:

AP              Access Point
CC              Central Controller
CL              Convergence Layer
DiL             Direct Link
DLC             Data Link Control
DUCC            DLC User Connection Control
EC              Error Control
H/2             HIPERLAN Type 2
HE              Home Environment
HIPERLAN/2      HIPERLAN Type 2
HO              HandOver
IEEE            Institute of Electrical and Electronics Engineers
LAN             Local Area Network
MSC             Message Sequence Chart
MT              Mobile Terminal
PDU             Protocol Data Unit
RBCH            RLC Broadcast CHannel
RLC             Radio Link Control
UBCH            User Broadcast CHannel
UDCH            User Data CHannel
WT              Wireless Terminal

# 4 Introduction to H/2 Home Network Architecture

H/2 home network is designed as an ad-hoc LAN, which can be put into operation in a plug-and-play manner. The H/2 home network utilizes the H/2 basic features in TS 101 761-1 [1] and TS 101 761-2 [2] by defining the following equivalence between the ad-hoc LAN configuration and the infrastructure based configuration:

- A Central Controller (CC) in the ad-hoc LAN configuration is equivalent to the Access Point (AP) in the infrastructure-based configuration.

- A Wireless Terminal (WT) in the ad-hoc LAN configuration is equivalent to the Mobile Terminal (MT) in the infrastructure-based configuration.

The DLC Extension for Home Environments TS 101 761-4 [3], defines then two types of H/2 home devices in a single subnet:

- Basic WT, consisting of the functions defined in the basic specifications [1], [2] for mobile terminals and the additional functions specified in [3] for wireless terminals.

- CC-capable WT, consisting of all functions for Basic WT, the functions specified in [1], [2] for Access Points, as well as the functions specified in [3] for central controller. A CC-capable WT acting as CC shall also be able to communicate with other WTs in the user plane as a basic WT. A CC-capable WT acts as a WT in the home network, if it is not selected as CC.

# 5 Physical layer functions from the Physical Layer-TS

TS 101 475 [7] shall be followed, with the following addition:

The direct link functions in clauses 5.7.5, 5.10.4 and 5.11.2.3 shall be supported.

The short prefix of 400 ns shall be implemented.

NOTE: In TS 101 475 [7], clause 5.11.3.2, two classes of receivers are defined. Class 2 receivers may not be able to properly decode signals from devices that are closer than a certain minimum distance from the transmitter.

# 6 Data Link Control functions from DLC-TS

See TS 101 761-1 [1] for the whole of this clause. This clause contains tables specifying which optional parts of the reference are made mandatory in the present TS. Optional parts in the basic specification that are not made mandatory here are still optional for a HE compliant system. A part can consist of sub parts. If the part is mandatory it can still contain optional sub parts.

- "M" in the tables below means that the part has been made mandatory in the present document.

- "(M)" means that it is already mandatory in TS 101 761-1 [1].

- "(O)" means that a part is already optional in TS 101 761-1 [1] and still optional in the present document.

## 6.1      Major capabilities

**Table 1: Connection modes**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| Centralized mode | Text sentence | 4, 5, 6 | (M) | (M) | |
| Direct mode | Text sentence | 4, 5, 6 | M | M | The logical channels (UDCH, UMCH, UBCH, RBCH, DCCH, LCCH) in direct link shall be supported.<br>DM transmission and reception functions are described in DLC Home Extension [3], clause 5. |

**Table 2: MAC functions**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| Fixed capacity agreement | Text sentence | 6.3.4 | M | M | FCA is used to transmit the 1394 clock channel that every device shall be able to receive. |

## 6.2      Error control modes

**Table 3: Error control modes**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| Acknowledged mode for UDCH | Text sentence | 6.4.2.1 | O.1 | (M) | |
| Repetition mode for UBCH | Text sentence | 6.4.3.1 | O.1 | (M) | |
| Unacknowledged Mode | Text sentence | 6.4.4 | O.1 | (M) | |
| O.1:        The CC shall implement at least one of the above EC modes. | | | | | |

# 7        Radio Link Control functions from RLC-TS

See TS 101 761-2 [2] for the whole of this clause. This clause contains tables specifying what optional parts of reference are made mandatory in the present TS. Optional parts in the basic specification that are not made mandatory here are still optional for a HE compliant system. A part can consist of sub parts. If the part is mandatory it can still contain optional sub parts. If a reference to an MSC is made, and both MT and AP are marked "M", all signals in the MSC are mandatory to transmit/receive.

- "M" in the tables below means that the part has been made mandatory in the present document.

- "(M)" means that it is already mandatory in TS 101 761-2 [2].

- "(O)" means that a part is already optional in TS 101 761-2 [2] and still optional in the present document.

# 7.1 Services supporting association control functions

## 7.1.1 Association and disassociation

**Table 4: Association and disassociation**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| RBCH association | MSC | 5.1.1.1 | (M) | (M) | The Network Operator ID is not used, therefore the parameter IDENTIFIER-FORMAT shall be set to "1" (network-id-unavailable). |
| RBCH association request | MSC | 5.1.1.1 | (M) | M | |
| Info Transfer | MSC | 5.1.1.8 | M | M | Needed by IEEE 1394 and Ethernet CL. |
| Generic type as authentication key identifier | MSC | 5.1.1.5.3.7 | M | M | The rest of the authentication key identifiers are still optional. AUTH-KEY (36 bytes) is of MT-AUTH-ID-TYPE "Generic". |
| Dm common key distribution | Clause header | 5.1.1.7 | M | M | |
| Pre-shared key based authentication | Clause header | 5.1.2.6.3 | (M) | (M) | |
| MT Alive | Clause header | 5.2.4 | (M) | (M) | Mandatory in TS 101 761-2 [2]. This is a clarification. It is recommended that the procedure described in RLC TS be followed. |

## 7.1.2 Key management

**Table 5: Key management**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| Common Key Refresh | MSC | 5.1.2.3.3 | M | (M) | |
| Common keys | Clause header | 5.1.2.3 | M | M | |

## 7.1.3 CL Broadcast and CL multicast

**Table 6: Broadcast and multicast**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| CL broadcast | Clause header | 5.1.5 | M | M | Both, IEEE 1394 CL [5] and Ethernet CL [8] require broadcast. |
| Multicast | Clause header | 5.1.4 | M | M | At least one of the two multicast methods shall be mandatory for the AP. The two methods are multicast addressing and n x unicast addressing. |
| NOTE: For applications where maximum cell size is required, the most robust phy mode should be used for the UBCH. UBCH is used for CL broadcast. | | | | | |

## 7.2 Services supporting Radio Resource Control (RRC) functions

### 7.2.1 Handover (Optional)

This clause is only for clarification, since handover is optional in the reference document and remains optional in the present document.

**Table 7: Handover**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| Sector handover | Clause header and MSC | 5.2.1.1 | (O) | (O) | Sectored antennas at the CC are out of the scope of the Home Environment. |
| Radio (intra-AP) handover | Clause header and MSC | 5.2.1.2 | (O) | (O) | |
| Network Handover | Clause header | 5.2.1.3 | (O) | (O) | |
| Forced Handover | Clause header and MSC | 5.2.1.6 | (O) | (O) | |

### 7.2.2 Transmission power control

**Table 8: Transmission power control**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| Direct link power control | Clause header | 5.2.3.3 | (O) | (O) | Transmit power control shall be used as specified in DLC HE [3] (see clause 8.3 of the present document) |

## 7.3 Services supporting DLC user connection control (DUCC) functions

### 7.3.1 Unicast direct link DUC setup

**Table 9: Unicast direct link DUC setup**

| Name | Type | Where | CC | WT | Comment |
|------|------|-------|----|----|---------|
| MT initiated DM DUC setup | Clause header | 5.3.7.2 | M | M | Only MT initiated set-up is mandatory, CC initiated is left optional. |
| MT initiated DM DUC release | Clause header | 5.3.8 | M | M | Only MT initiated release is mandatory, CC initiated is left optional. |

# 8 Additional functions from DLC Extension for Home Environment

See TS 101 761-4 [3] for the whole of this clause. This clause contains tables specifying what optional parts of reference are made mandatory in the present profile. Optional parts in the basic specification that are not made mandatory here are still optional for a Home Profile compliant system. A part can consist of sub parts. If the part is mandatory it can still contain optional sub parts. If a reference to an MSC is made, and both MT and AP are marked "M", all signals in the MSC are mandatory to transmit/receive.

- "M" in the tables below means that the part has been made mandatory in the present document.

- "(M)" means that it is already mandatory in TS 101 761-4 [3].

- "(O)" means that a part is already optional in TS 101 761-4 [3] and still optional in the present document.

## 8.1 Error control protocols

There may be two kinds of devices that implement the IEEE 1394 SSCS [5]. Some may be isochronous capable, and some may be not. This capability is determined by the *isc* bit of the HL2 ROM as defined in TS 101 493-3 [5], clause A.3.

**Table 10: Error control protocols**

| Name | Type | Where | CC | WT | Comment |
|---|---|---|---|---|---|
| EC protocol for the FEC mode for isochronous capable devices | Clause header | 5.8.4 | M | M | Mandatory only for isochronous streaming devices. |

## 8.2 Association control functions

**Table 11: Key management**

| Name | Type | Where | CC | WT | Comment |
|---|---|---|---|---|---|
| Terminal association for multiple convergence layers | Clause header | 6.2 | M | M | The message transfer to enable multiple convergence layers shall be supported. Whether more than one CL is implemented is up to the manufacturer. |
| Authentication key management | Clause header | 6.9 | M | M | |
| Encryption | Clause header | 5.10 | M | M | |

## 8.3      Radio resource control functions

**Table 12: Radio resource control functions**

| Name | Type | Where | CC | WT | Comment |
|---|---|---|---|---|---|
| Link adaptation in direct link phase | Clause header | 6.4 | M | M | |
| Power control in direct link | Clause header | 6.4 | M | M | |
| Link quality calibration for DM operation | Clause header | 6.5 | M | M | |
| Dynamic CC selection | Clause header | 6.7 | M | n/a | Dynamic CC selection is mandatory for all CC-capable WTs. |
| CC responsibility handover | Clause header | 6.8 | (O) | n/a | |

## 8.4      DLC user connection control functions

**Table 13: DLC user connection control functions**

| Name | Type | Where | CC | WT | Comment |
|---|---|---|---|---|---|
| Fixed slot allocation for DM | Clause header | 6.6.1 | O | O | |
| DiL multicast connection with QoS negotiations | Clause header | 6.6.2 | M | M | All DiL Multicast procedures are only mandatory for devices that support 1394 CL. They are e.g. used to transmit the 1394 clock channel. |

## 8.5      DLC HE Specific PDU Types

The basic WT and CC-capable columns indicate, whether the PDU is Mandatory or Optional to implement in basic WTs or CC-capable H/2-HDs. The PDU can be mandatory for both the sender and the receiver or the other peer only. If a PDU is mandatory for the sender, the sender shall be able to encode the PDU and send it at the correct time according to the present document. If the PDU is mandatory for the receiver, it shall be able to decode the PDU and perform the requested actions according to the present document. If the PDU is optional, the sender may not be able to encode or use it. If the PDU is optional the receiver may not be able to decode the PDU, but the receiver shall be able to send the corresponding RLC_NO_SUPPORT message TS 101 761-2 [2].

**Table 14: HE LCH PDU messages**

| RLC message name | CC | WT |
|---|---|---|
| RLC_CALIBRATION_REPORT | M | M |
| RLC_DM_MC_SETUP | M | M |
| RLC_DM_MC_CONNECT | M | M |
| RLC_DM_MC_CONNECT_ACK | M | M |
| RLC_DM_MC_CONNECT_COMPLETE | M | M |
| RLC_DM_MC_CONNECT_COMPLETE_ACK | M | M |
| RLC_DM_MC_RELEASE | M | M |
| RLC_DM_MC_RELEASE_ACK | M | M |
| RLC_DM_MC_MODIFY | M | M |
| RLC_DM_MC_MODIFY_ACK | M | M |
| RLC_TRANS_CC_DATA | (O) | n/a |
| RLC_AUTHENTICATION_KEY_REQUEST | M | M |
| RLC_AUTHENTICATION_KEY_TRANSFER | M | M |

**Table 15: HE SCH PDU messages**

| RLC message name | CC | WT |
|---|---|---|
| RLC_DM_POWER_CONTROL | M | M |
| RLC_CALIBRATION_MEASUREMENT_TRIGGER | M | M |
| RLC_ CALIBRATION_MEASUREMENT | M | M |
| RLC_CALIBRATION_REPORT_TRIGGER | M | M |
| RLC_SHORT_CALIBRATION_REPORT | M | M |
| RLC_CALIBRATION_LINKQUALITYMAP_REQUEST | M | M |
| RLC_ CALIBRATION_LINKQUALITYMAP | M | M |
| RLC_CC_HO_REQUEST | (O) | n/a |
| RLC_CC_HO_REQUEST_ACK | (O) | n/a |
| RLC_CC_HO_NOTIFY | M | M |
| RLC_TRANS_CC_DATA_ACK | (O) | n/a |
| RLC_START_CC | (O) | n/a |
| RLC_START_CC_ACK | (O) | n/a |
| RLC_CC_START_OPERATION | M | M |
| RLC_AUTHENTICATION_KEY_REQUEST_ACK | M | M |
| RLC_AUTHENTICATION_KEY_TRANSFER_ACK | M | M |

# 9       Convergence Layer functions from Packet based Convergence Layer-TS, Common part

TS 101 493-1 [4] shall be followed in its entirety.

# 10      References for Wireless 1394 Applications

## 10.1    Convergence Layer functions from IEEE 1394 Service Specific Convergence Sublayer-TS

In the case of wireless 1394 devices, TS 101 493-3 [5] shall be followed in its entirety.

## 10.2    Bridge Layer functions from IEEE 1394 Bridge Specific Functions Sublayer-TS

In the case of 1394 bridging devices, TS 101 493-4 [6] shall be followed in its entirety.

# 11      References for Wireless Ethernet Applications

## 11.1    Convergence Layer functions from Ethernet Service Specific Convergence Sublayer-TS

In the case of Ethernet devices, TS 101 493-2 [8] shall be followed in its entirety.

# History

| Document history | | |
|---|---|---|
| V1.1.1 | July 2001 | Publication |
| V1.2.1 | December 2001 | Publication |
| | | |
| | | |
| | | |