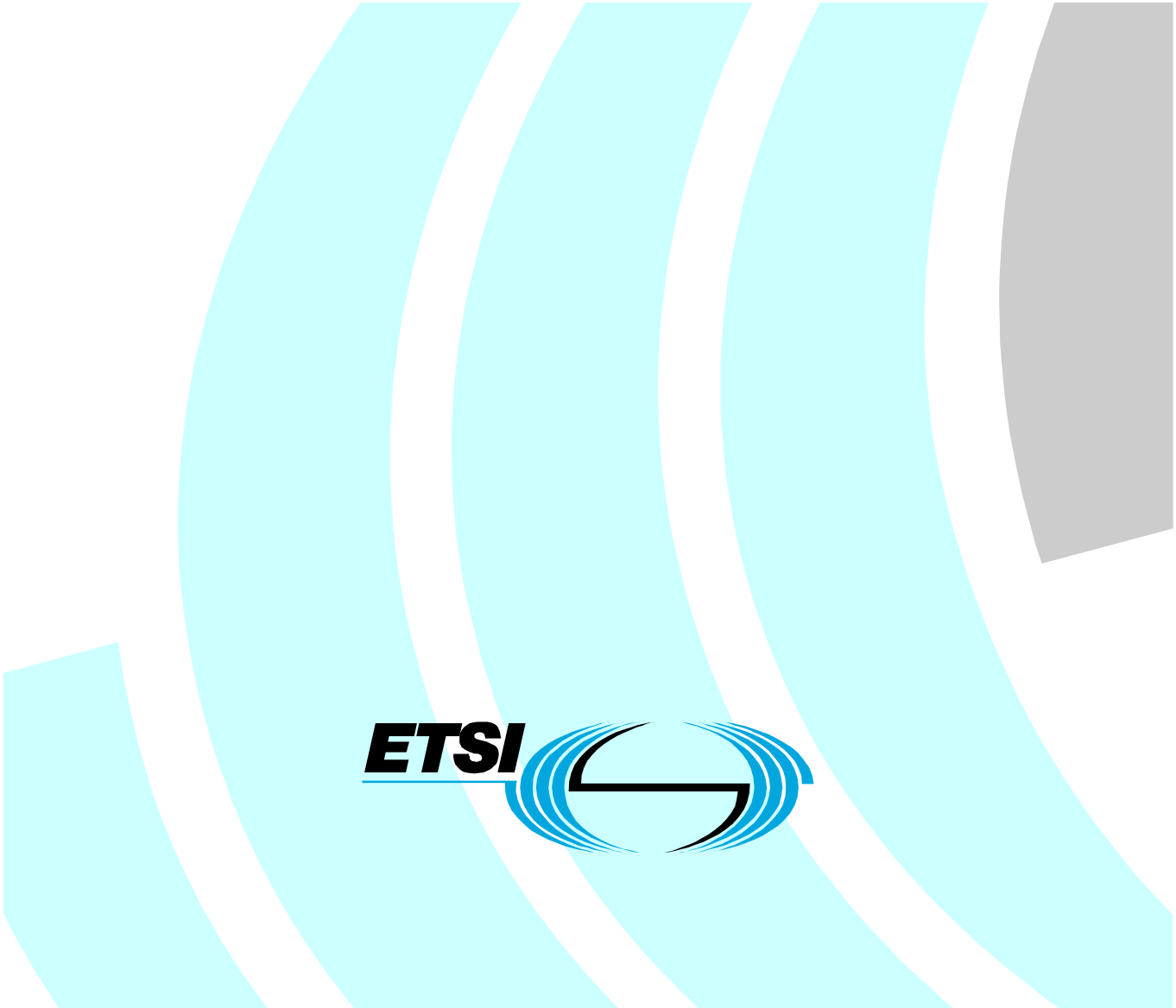
ETSI TS 101 761-3 V1.2.1 (2001-12)

Technical Specification

Broadband Radio Access Networks (BRAN);
HIPERLAN Type 2;
Data Link Control (DLC) Layer;
Part 3: Profile for Business Environment



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Contents

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Foreword

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

The present document is part 3 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 referenced HIPERLAN/2 documents are:

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

  Part 1: Basic Data Transport Functions [1]

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

- Packet based Convergence Layer (ETSI TS 101 493)

  Part 1: Common Part [3]

  Part 2: Ethernet Service Specific Convergence Sublayer [4]

- Physical Layer (ETSI TS 101 475 [5])
- Network Management (ETSI TS 101 762 [6])

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.

1 Scope

The present document specifies the interoperability functions needed for a business environment. It contains functions of the Data Link Control Layer, the Radio Link Control Sublayer, the Convergence Layer, the Physical Layer and Network Management specifications 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 basic 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 and handover.

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

- The fixed network is a Local Area Network (LAN) of the types Ethernet and IEEE802.1/2/3.
- The traffic type is data traffic that is handled connectionless but with priorities by the Ethernet. The amount of streaming services is small.
- Most of the data traffic goes between a terminal and the fixed network.
- The fixed LAN network is usually physically well protected since it is installed in restricted areas.

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 (V1.3.1): "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 101 493-1 (V1.1.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based Convergence Layer; Part 1: Common Part".

[4] ETSI TS 101 493-2 (V1.2.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based Convergence Layer; Part 2: Ethernet Service Specific Convergence Sublayer (SSCS)".

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

[6] ETSI TS 101 762 (V1.1.1): "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Network Management".

[7] ISO/IEC 15802-3 (1998) [ANSI/IEEE Std 802.1D, 1998 Edition]: "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Common specifications - Part 3: Media Access Control (MAC) Bridges".

[8] IETF RFC 826: "Ethernet Address Resolution Protocol: Or converting network protocol addresses to 48.bit Ethernet address for transmission on Ethernet hardware".

[9] IETF RFC 903: "Reverse Address Resolution Protocol".

[10] IETF RFC 2236: "Internet Group Management Protocol, Version 2".

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:

ANSI	American National Standards Institute
AP	Access Point
CL	Convergence Layer
DLC	Data Link Control
EUI	Extended Unique Identifier
HO	HandOver
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IETF	Internet Engineering Task Force
ISO	International Organization for Standardization
LAN	Local Area Network
MSC	Message Sequence Chart
MT	Mobile Terminal
NW	NetWork
RBCH	RLC Broadcast CHannel
RFC	Request For Comments
RLC	Radio Link Control
UBCH	User Broadcast CHannel
UDCH	User Data CHannel

4 Data Link Control functions from DLC-TS

ETSI TS 101 761-1 [1] shall be followed, with the following comments:

- Functions for direct link/direct mode and central controller need not be implemented.
- Functions for fixed capacity agreement need not be implemented. See clause 6.3.4 in TS 101 761-1 [1].

Table 1: Error control

Name	Type	Where?	AP	MT	Comment
Acknowledged mode for UDCH	Text sentence	6.4.2.1	M	(M)	
Repetition mode for UBCH	Text sentence	6.4.3.1	M	(M)	
Discarding of long PDUs in repetition mode	Text sentence	6.4.3.9	M	(M)	

5 Radio Link Control functions from RLC-TS

5.1 General

See TS 101 761-2 [2] for the whole of this clause. This clause contains tables specifying what optional parts of reference that are made mandatory in the present document. The tables also specify what optional parts in reference that shall not be implemented due to lack of negotiating possibilities. Optional parts in the basic specification that are not made mandatory here are still optional for a BE compliant system. A part can consist of sub parts. If the part is mandatory it can still contain optional sub parts. To summarize, the handover function is mandatory and shall be implemented. The functions direct link/direct mode and fixed capacity agreement are still optional and need not be implemented. 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.

5.2 Association and disassociation

Table 2: Association and disassociation

Name	Type	Where?	AP	MT	Comment
RBCH association request	MSC	5.1.1.1	(M)	M	The alternative to having it M for the MT is to maximize the interval time of RLC RBCH ASSOCIATION
Info Transfer	MSC	5.1.1.8	M	M	Needed for the Ethernet CL and for handover. Multiple CLs in the MT are still optional
Authentication Net Acc Id	MSC	5.1.1.5.3.4	M	M	The rest of the authentication key identifiers is still optional
MT Alive	Clause header	5.2.4	(M)	(M)	Mandatory in RLC TS. This is a clarification. It is recommended that the procedure described in RLC TS is followed
RLC-MT-ALIVE-REQUEST	Message	5.2.4, diagram 54	M	M	Clarification
RLC-MT-ALIVE-REQUEST-ACK	Message	5.2.4, diagram 54	M	M	Clarification
RLC-MT-ALIVE	Message	5.2.4, diagram 55	M	M	Clarification
RLC-MT-ALIVE	Message	5.2.4, diagram 55	M	M	Clarification

Rule: The MT shall not request sleep during association. The association starts when the MT transmits RBCH-ASSOCIATION-REQUEST or MAC-ID-ASSIGN and stops when the MT receives MT-INFO-ACK. The MT shall not request sleep during the following: connection set-up, broadcast-join and multicast group join, if present.

NOTE: The AP should use the NOP-ID in the RBCH-ASSOCIATION.

5.3 Key management

Table 3: Key management

Name	Type	Where?	AP	MT	Comment
Unicast Key Refresh	MSC	5.1.2.2	M	(M)	
Common keys	Clause header	5.1.2.3	M	M	CL broadcast is M for Ethernet

5.4 CL Broadcast and CL multicast

Table 4: Broadcast and multicast

Name	Type	Where?	AP	MT	Comment
CL broadcast	Clause header	5.1.6	M	M	The Ethernet CL requires broadcast
CL Broadcast Group Join	MSC	5.1.6	M	M	
Multicast	Clause header	5.1.5	M	(O)	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
Multicast Group Join	MSC	5.1.5	M	(O)	
Multicast Group Join Ack	MSC	5.1.5	M	(O)	
Multicast Group Leave	MSC	5.1.5	M	(O)	
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.					

5.5 Handover

Table 5: Handover

Name	Type	Where?	AP	MT	Comment
Network Handover	Clause header	5.2.1.3	M	M	
Forced Handover	Clause header and MSC	5.2.1.6	(O)	M	
HO Association	MSC	5.2.1.3	M	M	
RLC_HANDOVER-NOTIFY	Message	5.2.1.3, diagram 37	(O)	(O)	Still optional
HO Link Capability	MSC	5.2.1.3	M	M	
Token NW Signalling	MSC	5.2.1.3	M	M	Can be used only if an AP-AP protocol is defined
Network Handover Info Distribution	MSC	5.2.1.4	M	M	Token distribution from the old AP
Handover Completion	MSC	5.2.1.4	M	M	
Handover Rejection	Clause header	5.2.1.5	M	M	
Sector Handover	Clause header	5.2.1.1	(O)	M	
RLC_SECTOR_HANDOVER_REQUEST	Message	5.2.1.1	(O)	M	
RLC_SECTOR_HANDOVER_ACK	Message	5.2.1.1	(O)	M	
Radio (intra-AP) handover	Clause header and MSC	5.2.1.2 and diagram 35	(O)	M	

Rule: The MT shall not request sleep during handover. Handover starts when the MT transmits handover-request and stops when the MT receives handover-complete. The MT shall not request sleep during the following broadcast join procedure and the multicast group join procedure, if present.

5.6 Profile identifier and version

These parameters in annex B need defined values.

5.6.1 Profile identifier

The PROFILE-ID value for the business profile is 1.

5.6.2 Profile version

The PROFILE-VERSION value is 1 for this version of the business profile specification.

6 Convergence Layer functions from Packet based Convergence Layer-TS, Common part

TS 101 493-1 [3] shall be followed in its entirety.

7 Convergence Layer functions from Ethernet Service Specific Convergence Sublayer-TS

TS 101 493-2 [4] shall be followed, but with the following rules:

1) clause 6.3.4: The network addresses IEEE EUI-64 and IPv6 need not to be supported;

2) clause 4; clauses 5.1, 5.2.3, 5.3.1, 5.4.2, 5.4.3; tables 5.1 and 5.2: The priority mechanism shall be used and at least two priorities (queues) shall be used;

3) the subnet mask should be used.

8 Physical layer functions from the Physical Layer-TS

TS 101 475 [5] shall be followed, but with the following comments:

- The direct link functions in clauses 5.7.5 and 5.10.4 need not to be supported.

9 Network Management functions from the network management TS.

TS 101 762 [6] shall be followed in its entirety.

Annex A (informative): Broadcasting and multicasting in combined IP/Ethernet- and Hiperlan 2 networks

See ISO/IEC 15802-3 [7] and RFC 2236 [10].

Layers above Ethernet, for example IP, requires broadcast and multicast for certain functions. Some types of such functions are network related such as Address Resolution Protocol (ARP), reverse Address Resolution Protocol (RARP) and Dynamic Host Configuration Protocol (DHCP). Other types of such functions are end user related, for example broadcasting or multicasting of video and audio. All of these services are mapped to Ethernet frames with broadcast- or multicast addresses with the addition of a priority. What will happen in different situations is to a certain extent implementation specific. All broadcast frames coming from the fixed Ethernet go out over the air if the AP is a layer 2 machine, not analyzing what is above the link layer. Multicast frames coming from the fixed network can be filtered out by the AP if there are no members of the group in the AP. Broadcast frames coming from one of the MTs associated to the AP can be broadcast back over the air by the AP and also sent out on the fixed network. Multicast frames coming from an MT associated to the AP can be sent out again over the air by the AP and also out over the fixed network.

Annex B (informative): Network handover in a combined IP/Ethernet- and HIPERLAN/2 networks

See ISO/IEC 15802-3 [7], RFC 826 [8] and RFC 903 [9].

The HIPERLAN/2 standard is a standard for the air interface only. Handover between APs using the token passing method is, of course, dependent on the fixed network and also puts demands on the network. The protocols of the fixed network has to carry handover information between the APs at different levels of the protocol stack and find the APs. For carrying the handover information, Ethernet and IP are used at the bottom levels of the protocol stack and, on top of that a transport protocol, for example UDP. Above these levels follows the AP-AP protocol itself. There is no standard or commonly used protocol for AP-AP handover communication, so such a protocol has to be agreed upon outside the ETSI/BRAN community.

When an MT moves to another AP that is connected to the same subnet as the old one, the Ethernet switches have to be informed about it. The switches are self learning, meaning that they will register the MAC address of a terminal that sends frames to one of its port. The MT has to send some type of broadcast information that is transmitted to every switch in the subnet. Such broadcast information is, for example, ARP and gratuitous ARP.

When a MT moves to another AP that is connected to another subnet, then the new AP is connected to another side of a router and this is a type of mobile IP. The new AP and the MT detects that the MT has moved to another subnet by comparing the IP address of the old AP with the IP address of the new AP. Since probably the MT has to get a new IP address or find a foreign agent at the new subnet, it will broadcast a DHCP message or an agent solicitation message on the new subnet. This will also update the Ethernet switches on the new subnet.

How do the new AP find the old AP? As written above, the AP-ID, NET-ID and IP address of the old AP is given to the new AP via the MT. The AP-ID is sent by the MT very early, in the handover-request signal, whereas the IP address of the old AP is sent somewhat later, in the info-transfer signal. This is because the IP address should be protected by encryption. The mapping between AP-ID and its corresponding IP address can also be achieved by a pre-configured table or by using a name service in the fixed network, for example DNS (Domain Name Service). If there is a mapping between the AP-ID of the old AP and the IP address of the old AP, then the new AP can begin to communicate with the old AP directly at the reception of the HO request. If there is no such mapping, then the MT has to use the re-association procedure. Also the re-association starts with ho-request so that the AP-ID of the old AP is transferred to the new one. The mapping will then be created at the info-transfer procedure.

Annex C (informative): Bibliography

- IEEE 802.3 (1998): "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".
- IEEE 802.3ac (1998): "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) frame extensions for Virtual Bridged Local Area Networks (VLAN) tagging on 802.3 networks".

History

Document history		
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