Application Note 164/13 v01

Title: **Handling of reserved EFF-values**

Status: **Date:**

Draft Proposal   2013.08.02

Transitional period: Immediate effect after Final Voting.

Date: 2013.08.02

Subject: Specification of the handling of reserved values of the field
Extended Frame Format in end devices, Couplers and Interfaces.

Documents   **Modified**

[01]   [01]   Chapter 3/2/2 "Twisted Pair 1"
[02]   [02]   Chapter 3/3/2 "Data Link Layer General"
[03]   [03]   Chapter 3/5/1 "Resources"
[04]   [04]   Part 9/3 "Couplers" v1.2 DV 2013.01.15

                                         Referred

[05]   [05]   AN161 "Coupler Model 2.0"

Document updates

Version	Date	Modifications
KSG477-01	2010.12.14	- Document creation

KSG477-02	2013.05.15	- Inclusion of feedback of KSG meeting of 2013.03.05-06.
		    - Removal of confusing Ctrl-field information in the "Data Link Layer General" – see 2.2.1.
		    - Proposal for extended specification of CTRLE – see 2.2.1.1.
		    - Ignoring unknown TP1 Frames – see 2.2.1.2.
		    - Integrated the risk of the behaviour of current implementations for future assignment of today reserved EFF values – see 3.6.1.
		    - Added the open points at the end of the paper.
		    - Compared with 9/3.

KSG477-03	2013.07.09	- Accepted all changes. - Inclusion of feedback of KSG meeting of 2013.06.11-12.
AN164 v01	2013.08.02	- Inclusion of the feedback from the KSG commenting cycle. - Preparation of the Draft Proposal.

Contents

1 Purpose, motivation and scope

1.1 Motivation

It is not specified in the KNX Specifications how any KNX device shall react on receiving a KNX Extended Frame (L_Data_Extended) with a reserved value for the field EFF.

From investigation by KSG members, it appears that the handling differs between the existing implementations.

For instance, it is assumed by implementations that the next fields always be the 2 octet SA, the 2 octet DA and the 1 octet Length and that the DA is to be interpreted as a geographical tag or an application specific tag.

Also some existing Couplers have this behaviour: the Router routes two Frames with the same LTE DA but with different EFF in the same way.

These reserved values are meant for future extensions, which are by this behaviour limited in their possible use. Therefore, the handling needs to be fixed.

1.2 Scope

This document contains requirements for end devices, Couplers and Interfaces.

2 Specification

2.1 Terms and definitions

▤ This clause is not intended for integration in the KNX Specifications.

This document does not introduce neither modify any terms, definitions or abbreviations.

2.2 Stack and communication

2.2.1 Communication Medium TP1 (Chapter 3/2/2)

2.2.1.1 Extended Control field (CTRLE)

*▤ The clause 2.2.5.3 "Extended Control field (CTRLE)" in [01] shall be **replaced** by the following.*
The original text is in black and the modifications and extensions are in red. Removed text is not shown.

If the Frame Type flag FT = 1 in the CTRL field, an Extended Control field CTRLE shall follow on octet 1.

The CTRLE shall contain the Extended Frame format parameter EFF and the Hop Count parameter. Bit 7 shall contain the Destination Address Type (AT) flag g/i. The AT shall only indicate the Address Type and shall not point to a difference in the Frame Format.

Extended Control field								
7	6	5	4	3	2	1	0	
Address Type	Hop Count			Extended Frame format (EFF)				
AT				t	t	t	t	
0				0	0	0	0	*Point-to-point Addressed L_Data_Extended Frame*
0				0	0	0	1	*Reserved*
0				0	0	1	0	*Reserved*
0				0	0	1	1	*Reserved*
0				0	1	x	x	*Reserved*
0				1	0	0	0	*Reserved*
0				1	0	0	1	*Reserved*
0				1	0	1	0	*Reserved*
0				1	0	1	1	*Reserved*
0				1	1	0	0	*Reserved*
0				1	1	0	1	*Reserved*
0				1	1	1	0	*Reserved*
0				1	1	1	1	*Reserved*

Extended Control field								
7	6	5	4	3	2	1	0	
Address Type	Hop Count			Extended Frame format (EFF)				
AT				t	t	t	t	
1				0	0	0	0	Standard Group addressed L_Data_Extended Frame
1				0	0	0	1	Reserved
1				0	0	1	0	Reserved
1				0	0	1	1	Reserved
1				0	1	x	x	multicast zone addressed
1				1	0	0	0	Reserved
1				1	0	0	1	Reserved
1				1	0	1	0	Reserved
1				1	0	1	1	Reserved
1				1	1	0	0	Reserved
1				1	1	0	1	Reserved
1				1	1	1	0	Reserved
1				1	1	1	1	Reserved

Figure 1 – Extended Control field

📖 *The following note is not intended for integration in the KNX Specifications.*

NOTE 1   The Extended Frame Format type "multicast zone addressed" was in the past called "LTE-HEE extended address type" or "LTE-Mode extended address type". As this however refers at the very low level of the medium or in the Data Link Layer to an aspect of the Configuration Mode, high up in the Management, it has been concluded in the KSG meeting of 2013.06.11-12 to make this more independent and name this "multicast zone addressed".

2.2.1.2   Acknowledgement of (unknown) Data Link Layer services

📖 *This clause shall become a small new clause 2.4.1 in [01].*
The existing clause 2.4.1 "Data Link Layer operation modes and Data Link Layer acknowledge" shall be moved down.

Reserved fields shall not be used.

NOTE 2   This concerns the Data Link Layer for end devices and Couplers. Requirements for the externally accessible Data Link Layer are specified in clause 2.11 in [01].

In reception direction, if the Data Link Layer receives a Frame with an unknown Frame Format, then it shall do the following.

- It shall not pass the Frame to the Data Link Layer user.

- In case of a Coupler the Frame shall neither be routed.

- The Frame shall not be checked for "Frame Correctness" as specified in clause 2.5.3 in [01].

- No layer-2 acknowledge shall be sent (no ACK, no NAK and no BUSY.

This shall apply even for Layer-2 realisations implementing the non-selective Layer-2 acknowledge, which is only specified for group communication using the *Standard Group addressed L_Data_Extended Frame* and the *LTE-Mode Extended Address Type Frame*.

2.2.1.3 Externally accessible Busmonitor and Data Link Layer interface

In [01] clause 2.11 "Externally accessible Busmonitor and Data Link Layer interface", the following shall be added at the end.

It is the responsibility of the external user application, like the cEMI Client, to set the correct values of the Data Link Layer protocol fields, like the values of the field EFF. It is not required that the Data Link Layer corrects or refuses any service.

2.2.2 Data Link Layer General (Chapter 3/3/2)

*This shall **replace** in [02] clause 2.2.4 "**Usage of the Frame Format**."*
The Figure 5 will be removed.

The original clause already suggests that the Control Field is medium dependent, but does not really express it explicitly.
NOTE   This is actually only the specification of the service parameter frame_format of the L_Data-service in 3/2/2.
Any encoding information is removed here and this is replaced by a reference to the KNX Communication Media specifications.

In the L_Data-service, the service parameter frame_format shall indicate the Frame Format that is used for the transmission of the message. This shall apply both for reception direction (L_Data.ind) as well as for transmission direction (L_Data.req).

The types of Frame Formats that are supported and their indication in the KNX Frame – typically in the Ctrl-field – are medium dependent. Please refer to the specifications of the various KNX Communication Media for the specification - and indication of the Frame Formats.

In reception direction, if the Data Link Layer receives a Frame with an unknown Frame Format, then this Frame shall be ignored totally. It shall not be passed to the Data Link Layer user and in case of a Coupler it shall neither be routed. In case the communication medium supports Layer-2 acknowledges, these shall not be sent.

2.2.3 Network Layer for Routers

This clause is not intended for integration in the KNX Specifications.

As the scope of this paper is the handling of reserved EFF-values, it is also considered how the Coupler handles a Frame containing such a reserved value of the EFF-field.

Because of the requirements in this document for the Data Link Layer in general (clause 2.2.1.3) and for the KNX TP1 Data Link Layer (clause 2.2.1), the Data Link Layer of future Coupler implementations will not pass any Frame with reserved value of the field EFF to the Network Layer and such Frames will thus also not be routed.

The current test specifications for Couplers ([04]) already test that Frames with reserved value for the field EFF are not routed, regardless of the hop count or Filter Table and Parameters.

2.3 Resource definition or used Resources

2.3.1 PID_LTE_ROUTETABLE (PID = 52)

  The following shall be added at the end of the specification of this Property in Chapter 3/5/1 "Resources" ([03]) clause 4.5.4 "PID_LTE_ROUTETABLE".

Error – and exception handling

- **MaC**

    The MaC shall not set reserved values of the EFF-field in this Property.

- **MaS**

    In the Network Layer of the MaS, in the routing of LTE-Frames, there are no requirements concerning the exception handling of reserved values of the EFF-field.

    In the Data Link Layer of the MaS, messages with reserved values of the EFF-field will not be passed to the Network Layer, even if such entries are contained in the *LTE Address Routing Table Object* of a Coupler or Router.

    so that the preceding situation will normally not occur.

2.4 Management Procedures

  This clause is not intended for integration in the KNX Specifications.

This document does not introduce, neither modify any Management Procedures.

2.5 Configuration Procedures

  This clause is not intended for integration in the KNX Specifications.

This document does not introduce, neither modify any Configuration Procedures.

2.6 Usage and context

  This clause is not intended for integration in the KNX Specifications.

There is no specific use case for the specification contained in this paper, as it is a completion and correction of the existing specifications. So, the use is the same as for the existing L_Data_Extended-service.

2.7 Profile definition

  This clause is not intended for integration in the KNX Specifications.

This document does not introduce neither modify any Profiles.

For existing Profiles (July 2013), please refer to 3.4.

Compliance will be required for new to be defined Profiles and for the Coupler Model 2.0.

2.8 Identifiers and discovery

  This clause is not intended for integration in the KNX Specifications.

There are no identifiers for the discovery or control of the functionality specified in this paper. This can possibly only be done for the positive case through the Device Descriptor Type 0 (mask version) of the Coupler Model 2.0.

3 Impact and dependencies

3.1 System specification ("Handbook") dependencies

3.1.1 Part 9/3 "Couplers"

In [04], in the various tests concerning the blocking of Frames with reserved value of EFF, reference can be made to this document.

3.2 Configuration interworking

 📄 *This clause is not intended for integration in the KNX Specifications.*

Please refer to clause 3.5.

3.3 Run-time Interworking

 📄 *This clause is not intended for integration in the KNX Specifications.*

The specifications in this document do not influence runtime Interworking. It is the goal that through explicit specification of the handling of reserved value of the EFF-field, future, possible runtime, Interworking is guaranteed.

3.4 Registration and certification

3.4.1 Existing implementations

The handling of the reserved EFF-values will not have consequences for the sales and registration and certification of existing implementations of Couplers and end devices.

3.4.2 New implementations

The handling of the reserved EFF-values will however have immediate effect after Release for Voting for the following.

- For Coupler implementations submitted for renewed testing
- For new Coupler implementations
- For implementations of the Coupler Model 2 as specified in [05].

3.5 Integration and common tool impact

There are no requirements for ETS yet, because there is no use of any so far reserved EFF-value yet.

When any of the reserved EFF-values will be used as an extension of the KNX System, then ETS shall take into account that legacy implementations may incorrectly support the new Frame format and/or – service. Specifically, ETS will have to take care that legacy implementations (before the acceptance in RfV of this paper) may or may not route, possibly uncontrolled, Frames with the new EFF-value and that implementations of the Coupler Model 2.0 will in no case route these Frames.

3.6 Risks and compatibility issues

3.6.1 TP1 Acknowledgement of Frames with reserved EFF values

It is specified in the above that Frames with reserved values for the field-EFF shall be ignored totally and shall on TP1 not be acknowledged by the receiver.

Yet, implementations are known that do acknowledge all or some of such Frames.

EXAMPLE 1   Frames with AT = 0 but with the EFF standing for an LTE-Mode Frame.

If in the future such reserved EFF-values are used for new Frame formats and/or new Data Link Layer services, then KSG shall take into account that existing implementations may interpret the Frame and send an acknowledge (ACK, but also NACK, even if they are not addressed, but assume to be addressed because of a faulty interpretation of the new Frame format). This has to be taken into account.

EXAMPLE 2   Possibly, a new Frame Format could specify a new acknowledgement behaviour that could ignore the current acknowledge Frame.

3.6.2 cEMI Server Clients

Concerning the possibility to send Frames with a reserved value for the EFF-field, the only known possibility would be with certain cEMI-servers (possibly with RAW-mode). The responsibility for this lies with the – mostly not certified – cEMI Client.

There is no requirement to the cEMI Server to refuse transmission of KNX Telegrams with faulty value of the EFF-field.

3.6.3 Existing implementations

Implementations of the LTE Address Routing Table in the TP1 Coupler and in the KNXnet/IP Router are known that, in function of the value set for PID_LTE_ROUTESELECT, do forward and acknowledge Frames with reserved values for EFF.

Such implementations will no longer comply with the test specifications as laid down in Part 9/3 "Couplers" v1.2 Draft for Voting (January, 2013) ([04]).