



**Publicly Available Specification (PAS);
Intelligent Transport Systems (ITS);
MirrorLink®;
Part 18: IEEE 802.11™ Car Connectivity Consortium (CCC)
Information Element**

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

The present document is part 18 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.1].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document is part of the MirrorLink® specification which specifies an interface for enabling remote user interaction of a mobile device via another device. The present document is written having a vehicle head-unit to interact with the mobile device in mind, but it will similarly apply for other devices, which provide a color display, audio input/output and user input mechanisms.

IEEE allows defining vendor-specific Information elements, which are used to carry information not defined in the IEEE standard within a single defined format. The IE (Information Element) is located at the end of management frames, such as the beacon frame defined in IEEE 802.11 [1].

Multiple IEs can be concatenated. Based on the usage of IE, IEEE defines the formats of different kinds of IEs identified by the Element ID.

The present document specifies the IEEE 802.11 [1] CCC vendor-specific Information Element.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] IEEE Std. 801.11-2012™: "ISO/IEC/IEEE International Standard - Information technology-- Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications", 21 November 2012.

NOTE: Available at <https://ieeexplore.ieee.org/document/6361248>.

2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 103 544-1 (V1.3.1): "Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink®; Part 1: Connectivity".

3 Definition of terms, symbols and abbreviations

3.1 Terms

Void.

3.2 Symbols

Void.

3.3 Abbreviations

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

CCC	Car Connectivity Consortium
IE	Information Element
IEEE	Institute of Electrical and Electronics Engineers
ML	MirrorLink
OUI	Organizationally Unique Identifier
UPnP	Universal Plug and Play
URL	Universal Resource Locator

4 IEEE 802.11 Information Element

The IE (Information Element) is located at the end of management frames such as the beacon frame defined in 802.11 specification of IEEE [1]. Multiple IEs can be concatenated. Based on the usage of IE, IEEE defines the formats of different kinds of IEs identified by the Element ID.

The IEEE 802.11 Information Element format is given in Table 1.

Table 1: IEEE 802.11 Information Element Format

Field	Size (octet)	Value	Description
Element ID	1	Defined in [1]	Element identifier
Length	1	Variable	Length of sum of following elements
Information	Variable		Information (IE specific)

IEEE allows the definition of vendor-specific information elements, identified by the Element ID of 0xDD.

5 CCC Information Element

5.1 General

The format of the CCC Information Element is given in Table 2.

Table 2: MirrorLink Information Element Format

Field	Size (octet)	Value	Description
Element ID	1	0xDD	802.11 Vendor specific usage
Length	1	Variable	The length of sum of following elements
OUI (Organizationally Unique Identifier)	3	04-DF-69	CCC specific OUI assigned by IEEE
OUI Type	1		OUI type
Subelements	Variable		One or more subelements can follow

The Organizationally Unique Identifier (OUI) of the CCC Information Element shall be 0x04DF69. Allowed OUI Type values are given in Table 3.

Table 3: OUI Types

OUI Type (Decimal)	Note
0-8	Reserved for future use
9	MirrorLink 1.1
10	MirrorLink 1.2
11	MirrorLink 1.3
12-255	Reserved for future use

All MirrorLink subelements, as specified below, shall be available, unchanged, within future OUI types (i.e. within currently reserved OUI types).

5.2 MirrorLink Subelements

5.2.1 General

The MirrorLink Subelement format is given in Table 4.

Table 4: MirrorLink Subelement Format

Field	Size (octet)	Value	Description
Subelement ID	1		Identifier which represents the type of subelement (See Table 5).
Length	1	Variable	The length of sum of following elements
Subelement body field	variable		The value of subelement.

The Subelement ID shall have a value which represents the type of the Subelement. Allowed values are defined in Table 5.

Table 5: Subelement Identifier

Subelement ID (Decimal)	Note
0	MirrorLink UPnP device information
1	Internet Accessibility
2-255	Reserved

5.2.2 MirrorLink UPnP Device Information Subelement

The MirrorLink Device Information subelement is given in Table 6. The Subelement ID field shall have a value of 0x00.

Table 6: MirrorLink UPnP Device Information Subelement

Field	Size (octet)	Value	Description
Subelement ID	1	0x00	Identifier which indicates subelement type of UPnP device information of MirrorLink device.
Length	1	4	The length of sum of following elements
MirrorLink UPnP Device Information	4		The value of MirrorLink UPnP Device Information (See Table 7).

The format of the MirrorLink UPnP Device Information field is given in Table 7.

Table 7: MirrorLink UPnP Device Information Format

Bits	Name	Interpretation
2:0	UPnP Device Type	0x0: UPnP <i>TmServerDevice</i> :1 Server 0x1: UPnP <i>TmServerDevice</i> :1 Control Point 0x2 – 0x7: Reserved
3	<i>TmApplicationServer</i> :1 Service	0b0: Not supported 0b1: Supported
4	<i>TmClientProfile</i> :1 Service	0b0: <i>TmClientProfile</i> not supported 0b1: <i>TmClientProfile</i> supported
5	<i>TmNotificationServer</i> :1 Service	0b0: <i>TmNotificationServer</i> not supported 0b1: <i>TmNotificationServer</i> supported
15:6	Reserved	Reserved for additional services
31:16	Port number	Port number, used to make URL for UPnP device description fetching Shall be 0 (zero) in case of a MirrorLink Client sending the Information Element.

The UPnP Device Information subelement shall be included within the CCC Information Element, if the MirrorLink device is providing any MirrorLink functionality over Wi-Fi.

5.2.3 Internet Accessibility Subelement

The Internet Accessibility subelement is given in Table 8. The Subelement ID field shall have a value of 0x01.

Table 8: Internet Accessibility Subelement

Field	Size (octet)	Value	Description
Subelement ID	1	0x01	Identifier which indicates subelement type of Internet Accessibility.
Length	1	2	Length of sum of following elements
Internet Accessibility	2		Value of Internet Accessibility (See Table 9)

The format of the Internet Accessibility Information field is given in Table 9.

Table 9: Internet Accessibility Information Format

Bits	Name	Interpretation
1:0	MirrorLink Type	0b00: MirrorLink Server 0b01: MirrorLink Client with support for single ML Server 0b10: Reserved 0b11: MirrorLink Client with support for multiple ML Servers
2	Internet Access Support	0b0: Not supported 0b1: Supported
3	Internet Access Required	0b0: Not required 0b1: Required
7:4	Reserved	
15:8	MirrorLink Client Preference	MirrorLink Client's preference in case where GO role conflict happens; <ul style="list-style-type: none"> • 0x00: No conflict or not a MirrorLink Client • 0x01: Internet Access Required • 0x02: Multiple MirrorLink Server Support

The Internet Accessibility Information subelement may be included within the CCC Information Element, if the MirrorLink device is providing MirrorLink functionality over Wi-Fi. In case the Internet Accessibility Information subelement is missing from the CCC Information Element, the receiving MirrorLink device should implement a behavior as if the following default values had been received:

- ML Type: 0b00 or 0b01 (dependent on MirrorLink device type)
- Internet Access Support: 0b0 (Not supported)
- Internet Access Required: 0b0 (Not required)
- ML Client Preference: 0b00 (No conflict or not a MirrorLink Client)