



**Publicly Available Specification (PAS);
Intelligent Transport Systems (ITS);
MirrorLink®;
Part 26: Consumer Experience Principles and Basic Features**

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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 26 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 colour display, audio input/output and user input mechanisms.

MirrorLink is a single protocol that defines how a MirrorLink enabled Client device (typically the consumer's in-vehicle infotainment system) and a MirrorLink enabled Server device (typically the consumer's mobile device) communicate and provide an integrated consumer experience, where the MirrorLink Server is creating the consumer experience, running MirrorLink applications, whose user interfaces are presented via the MirrorLink Client. Consumers will only interact with the MirrorLink Client device, leaving the MirrorLink Server device stored away, allowing for responsible interactions, while the vehicle is in motion.

The MirrorLink protocol enables mobile device's consumer experience to be projected on the in-vehicle infotainment system. It enables the consumer to use the controls of the infotainment system to manipulate the mobile device. By using applications, following application-level requirements, either for use in drive or non-drive situations, consumers will see an experience optimized for the current situation.

Whereas the MirrorLink protocol specifies a consumer experience, it is open to implementation specific decisions and variations from Client and Server manufacturers. Differentiation in the consumer experience and supported features is encouraged. However, MirrorLink does need to be predictable and recognizable to the consumer. It is also critical for a MirrorLink brand recognition.

The present document specifies the basic consumer experience, for which MirrorLink stands for and many of the features MirrorLink enables. The present document intends to focus on the consumer experience level and does not intend to replace any requirements of the other technical specifications. Whether or not a MirrorLink Client or Server device follow the requirements defined within the present document will be mainly evaluated and tested through IOP testing.

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.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

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

- [1] ETSI TS 103 544-2 (V1.3.1): "Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink®; Part 2: Virtual Network Computing (VNC) based Display and Control".
- [2] ETSI TS 103 544-9 (V1.3.1): "Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink®; Part 9: UPnP Application Server Service".
- [3] ETSI TS 103 544-10 (V1.3.1): "Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink®; Part 10: UPnP Client Profile Service".
- [4] ETSI TS 103 544-12 (V1.3.1): "Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink®; Part 12: UPnP Server Device".

[5] Car Connectivity Consortium CCC-RQ-005: "Application Requirements for Drive Certification".

NOTE: Available at https://carconnectivity.org/wp-content/uploads/2019/09/CCC-RQ-005-MirrorLink-ApplicationRequirements_2.0.8.pdf.

[6] Bluetooth Specification: "Hands-free Profile", Audio, Telephony, and Automotive Working Group, Revision 1.7.2, January 21, 2019.

NOTE: Available at https://www.bluetooth.org/docman/handlers/downloaddoc.ashx?doc_id=457090.

2.2 Informative 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 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:

API	Application Programming Interface
BT	Bluetooth
CCC	Car Connectivity Consortium
FB	FrameBuffer
FM	Frequency Modulation
HFP	Bluetooth Hands-Free Profile
HSML	High Speed Media Link
IOP	InterOPerability
ML	MirrorLink
RFB	Remote Framebuffer
RTP	Real-Time Protocol
SCO	Synchronous Connection-Oriented
UI	User Interface
UPnP	Universal Plug and Play
USB	Universal Serial Bus
VA	Video Audio
VNC	Virtual Network Computing
WFD	Wi-Fi Display

4 Consumer Experience Principles

The MirrorLink consumer experience is guided by a set of principles. Those principles are not strictly enforceable, as they are described on a high-level. Therefore, no obligation language is used in their description. But devices failing those principles will typically violate one or more of the MirrorLink technical requirements, as defined in the separate functional specification, or of the basic feature requirements as outlined in clause 5.

The MirrorLink set of consumer experience principles are:

- 1) Starting MirrorLink is simple.
- 2) Paired MirrorLink certified devices just work.
- 3) Consumers are provided with a consistent and predictable MirrorLink consumer experience.
- 4) Consumers are at no time expected to interact with the MirrorLink Server device, after initial MirrorLink connectivity has been established.
- 5) Consumers are only provided with visual and audio content appropriate for the driving mode and local region, the MirrorLink Client device is currently in.
- 6) Consumers are provided with a responsive MirrorLink consumer experience.
- 7) Consumers are provided with a clear visual user interfaces, with minimal or no stretching and distortion, showing legible graphics and text.
- 8) Consumers are provided with a clear audio playback experience, free from pops, crackles and hisses on the MirrorLink Client's speakers. Latencies in controlling the audio stream are minimal.
- 9) Consumers are provided with consumer-friendly prompts, only when necessary.
- 10) Consumers are provided with appropriate notifications in case something goes wrong or a consumer's action cannot be completed as expected ("No Silent Failure").
- 11) Consumers are provided with an uninterrupted MirrorLink experience until MirrorLink is ended.
- 12) Ending MirrorLink is simple and does not lead to unresponsive devices.
- 13) The use of MirrorLink functionality is described in respective consumer documentation or made available otherwise.
- 14) The consumer can easily recognize whether MirrorLink functionality is available.

5 Basic MirrorLink Features

5.1 Introduction

This clause summarizes the consumer experience related requirements for the various MirrorLink features, which are available using the MirrorLink protocol. Requirements provided within this clause are complementary to requirements in the detailed MirrorLink protocol specifications. Nevertheless, in case of a contradicting requirement or a contradicting obligation, the device vendor should apply the MirrorLink consumer experience principles as guidance as to which requirement to use.

The following clauses address features, which are either relevant to the consumer or which will message with the consumer.

5.2 First-Use Experience

The consumer installing MirrorLink on a supported mobile device is expecting an immediate first use experience, when connecting the device to a MirrorLink enabled in-vehicle infotainment system.

The following consumer experience requirements are defined:

- If no MirrorLink certified application, installed on the MirrorLink Server, can be presented on the MirrorLink Client, the MirrorLink Client shall inform the consumer about this fact. The MirrorLink Client should point to a location from where MirrorLink enabled compatible applications can be downloaded.
- If installed MirrorLink enabled applications are missing certificates, preventing their usage within MirrorLink, the requirements in clause 5.3 shall apply.

5.3 Download, Installation and Update of Applications

The consumer is able to download, install and update a suitable CCC or Member-certified application from any available application marketplace or via side-loading. In order to enable the consumer to use the application, e.g. while driving, the MirrorLink Server will need to evaluate the certification status prior first use. This validation requires the consumer to have the device connected to the Internet.

Failing to validate the certification status will not allow the consumer to use the application.

NOTE: Usability of an application refers to the application's expected use, as recorded in the certificate of the application. E.g. while a drive certified application may still be usable in park-mode, after the certificate cannot be validated for drive anymore, the application is not usable as expected in drive-mode.

Therefore, the following consumer experience requirements are defined:

- The consumer shall be able to install and update a MirrorLink application via the same mechanisms, as with any other regular non-MirrorLink application. Potential mechanisms include the download and installation from an application store or via side-loading.
- The consumer shall be able to install and update a MirrorLink application outside a MirrorLink session. The consumer shall be able to install and update a MirrorLink application inside a MirrorLink session, unless driving mode and/or geographic limitations apply (e.g. of the App Store application).
- The consumer shall be able to use a newly installed or updated MirrorLink application as expected, within a few seconds, unless the validation of the application certificate is not possible.
- The consumer shall be notified, when an installed or updated application cannot be used as expected, within MirrorLink within a few seconds. The consumer should not be notified, when the application can be used as expected. The notification should point out that internet connectivity is required to resolve the issue.
- A MirrorLink application, which is uninstalled from a MirrorLink Server device shall be immediately removed from the MirrorLink Server's application listings.
- Download, installation and update behaviour shall be independent of whether the device is new (i.e. after a factory reset) or used.

5.4 Listing of MirrorLink Applications

The consumer is able to launch application via listings of MirrorLink applications. Application listings are provided from the MirrorLink Client, via native MirrorLink Client user-interfaces or from the MirrorLink Server, via dedicated Home Screen applications. Latter one is accessible only via a MirrorLink session.

The following consumer experience requirements are defined:

- The order of the MirrorLink application list shall be consistent across multiple MirrorLink sessions.
- The MirrorLink Server's home screen application (if available), shall be listed first.
- The MirrorLink Server shall advertise drive-certified applications first in its application listing.
- The MirrorLink Client should show drive certified applications first in its application listing.
- The MirrorLink Server and the MirrorLink Server's home screen application shall not reorder the application list without explicit consumer interaction.

- The MirrorLink Server shall not change the order of the application listings within a MirrorLink session.
- The MirrorLink Server may offer an easily accessible mechanism that allows the consumer to control the sorting of the application listed. This mechanism should allow the consumer to sort the application list by frequency of use, name, install date, or other properties and to manually reorder the list.
- If a MirrorLink Client lists MirrorLink base certified applications in drive mode, those applications shall be clearly identifiable by the consumer (in drive mode) as not being available, e.g. graying them out. The consumer shall be able to distinguish a drive-certified application from a non-drive-certified application without any consumer interaction or launching the application. This requirement applies to drive and park mode. The MirrorLink Client may only list drive-certified applications in drive mode.

5.5 Management of Certified Applications

In order to enable the consumer to use the application, e.g. while driving, the MirrorLink Server will need to continuously evaluate the certification status on a regular basis. This validation requires the consumer to have the device connected to the Internet:

- The consumer shall have access to certified applications as long as the application is installed on the MirrorLink Server device and the certification status can be regularly validated by the MirrorLink Server.
- The consumer should not be notified, when the certification status of a MirrorLink application can be regularly validated.
- The consumer should not be notified, when the certification status of a MirrorLink application cannot be regularly validated, while the application is still usable as expected within MirrorLink.
- The consumer should be notified, when an application will soon become unusable as expected within MirrorLink. Advanced notice should be given at least 24 h prior.
- The consumer shall be notified, when a MirrorLink certified application became unusable within MirrorLink, for certification related reason. The notification should point out that internet connectivity may be required to resolve the issue.

In case the consumer has to be notified, the MirrorLink Server shall provide the notification.

Notifications should be provided outside a MirrorLink session or via separate notification/setting pages. Notification may be deferred, if needed (e.g. as the device is currently in drive mode and visual notification is not possible). Notification should be provided outside a MirrorLink session as well, when applicable (e.g. expiration of a certificate).

The MirrorLink Server should provide a "Certificate dashboard" application, which displays a list of all installed MirrorLink application. The application should allow the consumer to trigger the validation of the application certificates. This application may be not-MirrorLink enabled.

The MirrorLink Server should allow MirrorLink drive-certified applications, to call other driver certified applications, implementing a specific intent, e.g. to launch navigation or phone call functionality. This shall not cause uncertified content to become visible in the foreground of the MirrorLink screen.

5.6 Interacting with MirrorLink Applications

The consumer is able to interact with MirrorLink applications via Voice or Physical interaction with the Client devices user input controls, like the Client's touch screen, soft or hard buttons around the Client's screen or on the steering wheel.

The following consumer experience requirements are defined:

- All **soft** buttons, rendered by the MirrorLink Client around the MirrorLink Application's user interface, shall be usable and shall be consistent with the user's expectation of the underlying control event. I.e. a home button shall have home functionality.

- All **soft** buttons, rendered by the MirrorLink Server around the MirrorLink Application's user interface, shall be usable and shall be consistent with the user's expectation of the underlying control event. I.e. a home button shall have home functionality.
- All device key events, the MirrorLink Server is advertising in its Key Event Configuration message, shall be supported from the MirrorLink Server and/or respective MirrorLink applications.
- All **hard** buttons, supported by the MirrorLink Client within MirrorLink, shall be usable and shall be consistent with the user's expectation of the underlying control event. I.e. a home button shall have home functionality.
- Dedicated buttons, available within MirrorLink, it shall have the same semantics within MirrorLink as in the native context outside of MirrorLink.

5.7 Listening to Entertainment and Navigation Audio

The consumer has access to his/her favourite entertainment and navigation applications, either run remotely from the MirrorLink Server or locally from the MirrorLink Client. The MirrorLink Server is responsible for mixing all remote audio sources into a single audio stream, which is streamed to the MirrorLink Client. The MirrorLink Client is responsible for mixing the MirrorLink audio stream with other local audio streams, and output the mixed audio stream via its speaker system.

NOTE: Local audio in the context of the MirrorLink Client is referring to audio sources, which are handled outside of MirrorLink, like FM radio.

Within the scope of the present document, the mixing of two or more audio streams will result in either one audio stream being in the foreground and the others being in background, or one audio stream being heard and the others being silenced. The audio source of a silenced audio stream may be muted, paused or stopped, dependent on the type of audio source (application specific).

The following consumer experience requirements are defined:

- The MirrorLink Server shall give the same priority for its entertainment and navigation audio sources within MirrorLink as it gives outside a MirrorLink session.
- The MirrorLink Client shall give MirrorLink navigation audio a higher priority than local entertainment audio. The MirrorLink Client shall automatically switch back to local entertainment audio, after the MirrorLink navigation audio completes. The MirrorLink Client shall automatically resume local entertainment audio playback in this case, unless higher-priority activities are preventing this for the MirrorLink Client.
- The MirrorLink Client shall give local navigation audio a higher priority than MirrorLink entertainment audio. The MirrorLink Client shall automatically switch back to MirrorLink entertainment audio, after the local navigation audio completes, unless higher-priority activities are preventing this for the MirrorLink Client. The MirrorLink application should automatically resume MirrorLink entertainment audio playback in this case.

NOTE: CCC's application certification program may add specific requirements regarding automatic resume after audio unblocking.

- The MirrorLink Client shall give the MirrorLink entertainment or the local entertainment audio source, which had been selected by the user last, a higher priority. Switch back to the other entertainment source shall happen only based on consumer action.
- The MirrorLink Client may give unknown MirrorLink audio, while MirrorLink is in the foreground on the MirrorLink Client, a higher priority than local entertainment audio. The MirrorLink Client may then automatically resume local entertainment audio playback, once the unknown MirrorLink audio finishes.

NOTE: Within the present document unknown audio refers to the audio stream, for which the audio context is either missing or the application category is set to 0x00.

- The MirrorLink Client may treat unknown MirrorLink audio differently, depending on whether MirrorLink is in the foreground or in the background on the MirrorLink Client.