O. DisplayMessage

1. Introduction

With the DisplayMessage feature, OCPP enables a CSO to display a message or a cycle of messages on a Charging Station, that is not part of the firmware of the Charging Station. The CSO gets control over these messages: the CSO can set, retrieve (get), replace and clear messages.

Every message can be configured in different languages and different message formats. See DisplayMessageSupportedFormats. So the Charging Station can select the correct format/language when it needs to display a message to a user. Every message the CSO sends to the Charging Station has some parameters to control when and how a message is shown: priority, state, start/end time etc. See DisplayMessageSupportedPriorities.

NOTE	It is not possible to retrieve/modify messages not configured via SetDisplayMessageRequest. (In other words: Message coded in the firmware of a Charging Station cannot be modified.)

2. Use cases & Requirements

O001 - Set DisplayMessage

Table 234. O01 - Set DisplayMessage

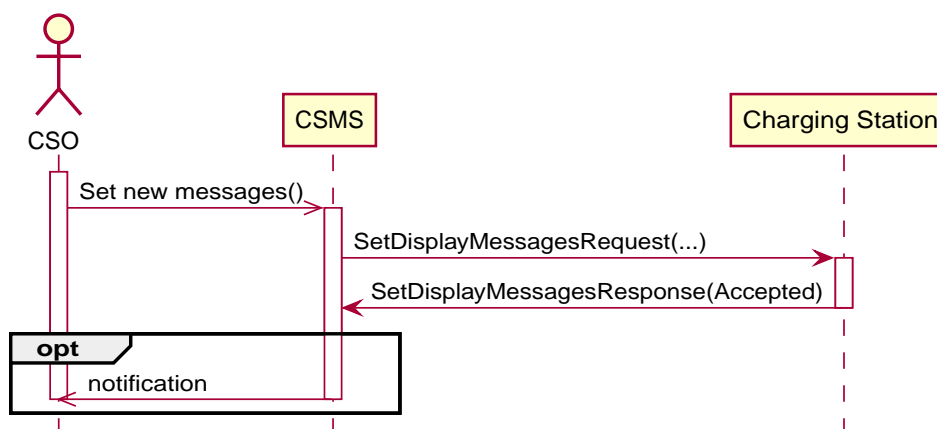| No.	Type	Description
1	**Name**	Set DisplayMessage
2	**ID**	O01
	Functional block	O. DisplayMessage
3	**Objectives**	To enable a CSO to display additional messages on a Charging Station that are not part of the firmware.
4	**Description**	This use case describes how a CSO can set a message to be displayed on a Charging Station. Depending on the given parameters the message shall be displayed a certain way and at a certain moment on the Charging Station.
	Actors	CSO, CSMS, Charging Station
	Scenario description	1. The CSO configures the CSMS to send a request to set a new message. 2. The CSMS sends a SetDisplayMessageRequest message to the Charging Station. 3. The Charging Station accepts the request by sending a SetDisplayMessageResponse message to the CSMS. 4. The Charging Station shows the new message on the display at the configured moment.
	Alternative scenario's	O002 - Set DisplayMessage for Transaction O006 - Replace DisplayMessage
5	**Prerequisites**	No messages configured with the same IDs.
6	**Postcondition(s)**	The new message will be displayed on the Charging Station (time, duration and position depending on configuration)

Figure 140. Set DisplayMessage sequence diagram

7	**Error Handling**	n/a
8	**Remarks**	The maximum number of messages that can be stored in a Charging Station can be read by the CSMS in the Configuration Variable:`NumberOfDisplayMessages`.maxLimit.

O001 - Set DisplayMessage - Requirements

Table 235. O01 - Set DisplayMessage - Requirements

ID	Precondition	Requirement definition
O01.FR.01	When the Charging Station receives a MessageInfo object via a SetDisplayMessageRequest and the priority of the message is not supported by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **NotSupportedPriority**.

ID	Precondition	Requirement definition
O01.FR.02	When the Charging Station receives a MessageInfo object via a SetDisplayMessageRequest and the state of the message is not supported by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **NotSupportedState**.
O01.FR.03	When the Charging Station receives a MessageInfo object via a SetDisplayMessageRequest and the format of the message is not supported by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **NotSupportedMessageFormat**.
O01.FR.04		When a CSMS sends a message to a Charging Station that does not belong to a transaction, the field: **transactionId** in the Message field SHALL be omitted.
O01.FR.05		The CSMS MAY include a startTime and endTime when setting a message.
O01.FR.06	O01.FR.05	The Charging Station SHALL NOT display the DisplayMessage message before the startTime.
O01.FR.07	O01.FR.05	The Charging Station SHALL remove a DisplayMessage message after the endTime.
O01.FR.08	When the Charging Station knows the language preferences of the EV Driver	The Charging Station SHALL display the DisplayMessage message in the preferred language, if available.
O01.FR.09	O01.FR.08	When no matching language is available, it is RECOMMENDED to show a DisplayMessage message in English as fall-back, if available.
O01.FR.10		The Charging Station SHALL store the messages in persistent storage, so they survive a power cycle/reboot of the Charging Station.
O01.FR.11	When the Charging Station receives a SetDisplayMessageRequest and the total number of messages after having handled this request will exceed `NumberOfDisplayMessages`.maxLimit.	The Charging Station SHALL respond with status: Rejected.
O01.FR.12	When the Charging Station receives a SetDisplayMessageRequest and the priority of the message is *NormalCycle*	The Charging Station SHALL show this message at the configured moment in the normal cycle of messages.
O01.FR.13	When the Charging Station receives a SetDisplayMessageRequest and the priority of the message is *InFront*	The Charging Station SHALL show this message at the configured moment, regardless of the normal cycle of messages.
O01.FR.14	When multiple messages with priority *InFront* are configured to be shown at the same time	The Charging Station SHALL cycle these messages.
O01.FR.15	When the Charging Station receives a SetDisplayMessageRequest and the priority of the message is *AlwaysFront*	The Charging Station SHALL show this message at the configured moment, regardless of other installed messages. Hence, it shall not cycle it with other messages and the Charging Station's own messages shall not override this message.
O01.FR.16	O01.FR.15 AND Another message with priority *AlwaysFront* is already set	The Charging Station SHALL replace the old message with the newly set message.
O01.FR.17		Language SHALL be specified as RFC-5646 tags, see: [RFC5646], example: US English is: "en-US"

O02 - Set DisplayMessage for Transaction

Table 236. O02 - Set DisplayMessage for Transaction

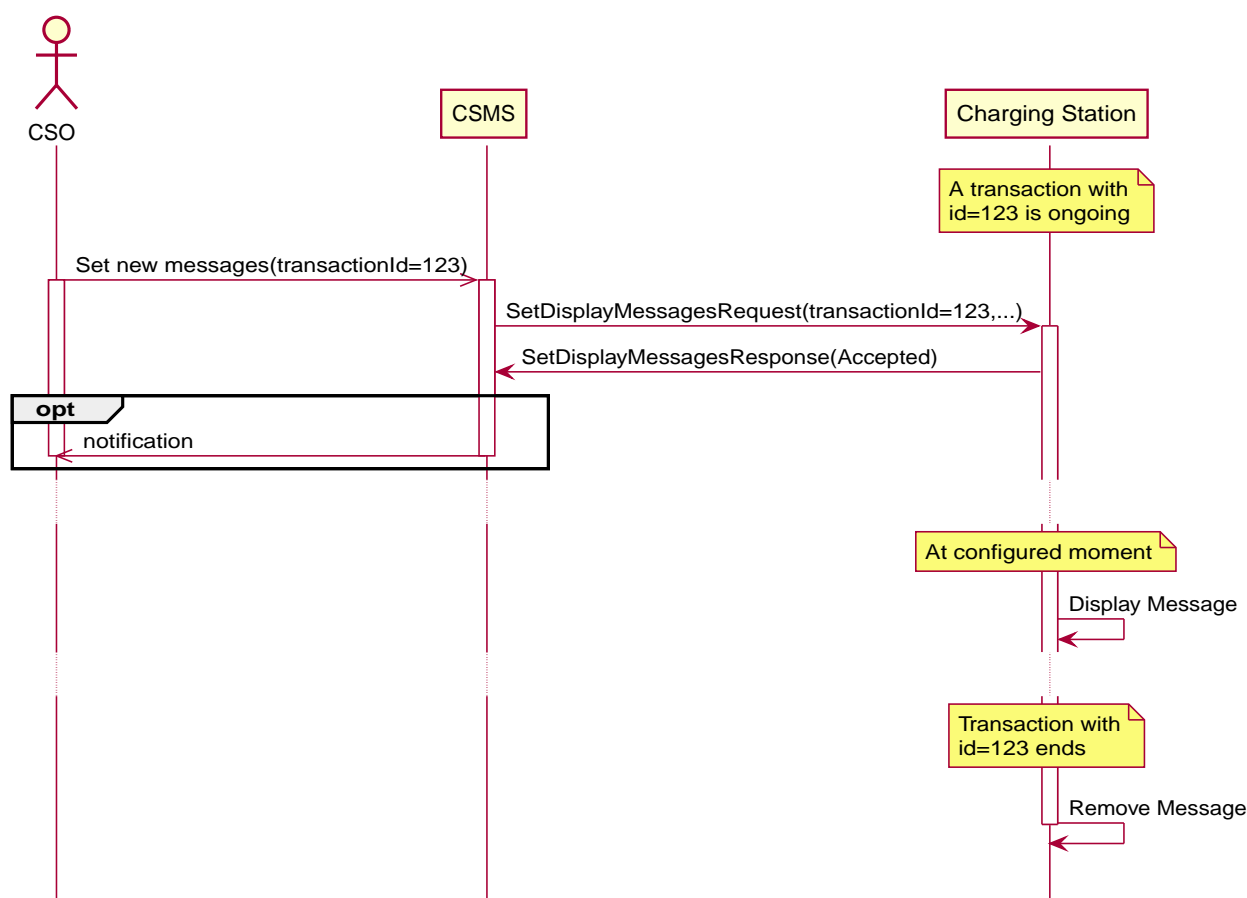| No.	Type	Description
1	Name	Set DisplayMessage for Transaction
2	ID	O02
	Functional block	O. DisplayMessage
	Parent use case	O01 - Set DisplayMessage
3	Objectives	To enable a CSO to display messages during an ongoing transaction on a Charging Station that are not build in to the firmware.
4	Description	This use case describes how a CSO can set a message to be displayed on a Charging Station for a specific transaction. Depending on the given parameters the message shall be displayed a certain way on the Charging Station.
	Actors	CSO, CSMS, Charging Station
	Scenario description	**1.** The CSO configures the CSMS to send a request to show a new message during a given transaction. **2.** The CSMS sends a SetDisplayMessageRequest message with the transactionId to the Charging Station. **3.** The Charging Station accepts the request by sending a SetDisplayMessageResponse message to the CSMS. **4.** The Charging Station shows the new message on the display while the transaction is ongoing.
	Alternative scenario's	O001 - Set MessageMessage O006 - Replace MessageMessage
5	Prerequisites	No messages configured with the same IDs.
6	Postcondition(s)	The new message will be displayed on the Charging Station while the transaction is ongoing (time, duration and position depend on configuration)

Figure 141. Set DisplayMessage for transaction sequence diagram

7	Error Handling	n/a

8	Remarks	The maximum number of messages that can be stored in a Charging Station can be read by the CSMS in the Configuration Variable:`NumberOfDisplayMessages`.maxLimit.

O02 - Set DisplayMessage for Transaction - Requirements

Table 237. O02 - Set DisplayMessage for Transaction - Requirements

ID	Precondition	Requirement definition
O02.FR.01	When the Charging Station receives a Message object via a SetDisplayMessageRequest and the **transactionId** of the message is not known by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **UnknownTransaction**.
O02.FR.02	When the transaction with the given **transactionId** ends	The Charging Station SHALL remove the message from the list of messages.
O02.FR.03	When the Charging Station receives a MessageInfo object via a SetDisplayMessageRequest and the priority of the message is not supported by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **NotSupportedPriority**.
O02.FR.04	When the Charging Station receives a MessageInfo object via a SetDisplayMessageRequest and the state of the message is not supported by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **NotSupportedState**.
O02.FR.05	When the Charging Station receives a MessageInfo object via a SetDisplayMessageRequest and the format of the message is not supported by the Charging Station	The Charging Station SHALL send a SetDisplayMessageResponse with status: **NotSupportedMessageFormat**.
O02.FR.06		The Charging Station SHALL NOT display the DisplayMessage message before the startTime.
O02.FR.07		The Charging Station SHALL remove a DisplayMessage message after the endTime.
O02.FR.08	When the Charging Station knows the language preferences of the EV Driver	The Charging Station SHALL display the DisplayMessage message in the preferred language, if available.
O02.FR.09	O02.FR.08	When no matching language is available, it is RECOMMENDED to show a DisplayMessage message in English as fall-back, if available.
O02.FR.10		The Charging Station SHALL store the messages in persistent storage, so they survive a power cycle/reboot of the Charging Station.
O02.FR.11	When the Charging Station receives a SetDisplayMessageRequest and the total number of messages after having handled this request will exceed `NumberOfDisplayMessages`.maxLimit.	The Charging Station SHALL respond with status: Rejected.
O02.FR.12		Language SHALL be specified as RFC-5646 tags, see: [RFC5646], example: US English is: "en-US"
O02.FR.14	When the Charging Station receives a SetDisplayMessageRequest and the priority of the message is *NormalCycle*	The Charging Station SHALL show this message in the normal cycle of messages.
O02.FR.15	When the Charging Station receives a SetDisplayMessageRequest and the priority of the message is *InFront*	The Charging Station SHALL show this message at the configured moment, regardless of the normal cycle of messages.
O02.FR.16	When multiple messages with priority *InFront* are configured to be shown at the same time	The Charging Station SHALL cycle these messages.
O02.FR.17	When the Charging Station receives a SetDisplayMessageRequest and the priority of the message is *AlwaysFront*	The Charging Station SHALL show this message at the configured moment, regardless of other installed messaged. Hence, it shall not cycle it with other messages and the Charging Station's own message shall not override this message.

ID	Precondition	Requirement definition
O02.FR.18	O02.FR.17 AND Another message with priority *AlwaysFront* is already set	The Charging Station SHALL replace the old message with the newly set message.

O03 - Get All DisplayMessages

Table 238. O03 - Get All DisplayMessage IDs

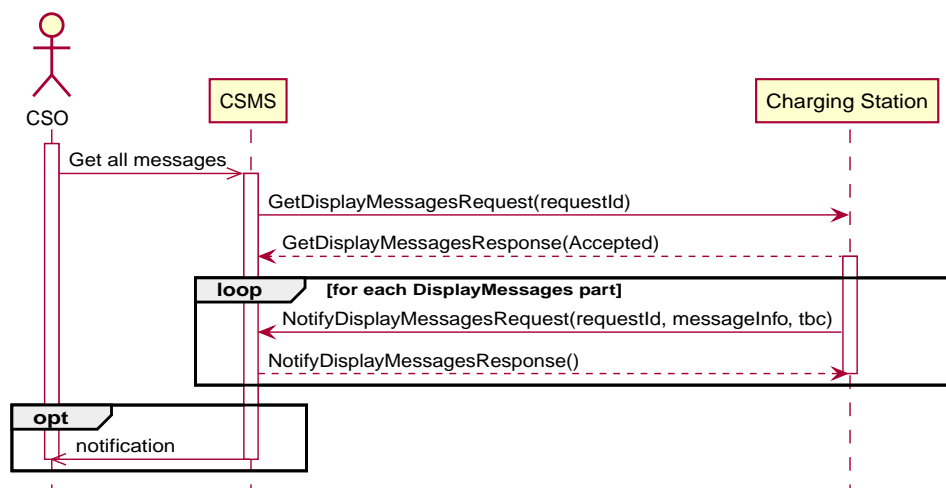| No.	Type	Description
1	Name	Get All DisplayMessages
2	ID	O03
	Functional block	O. DisplayMessage
3	Objectives	Enable a CSO to retrieve all messages currently configured in a Charging Station.
4	Description	This use case describes how a CSO can request all the installed DisplayMessages configured via OCPP in a Charging Station. The Charging Station can remove messages when they are out-dated, or transactions have ended. It can be very useful for a CSO to be able to view to current list of messages, so the CSO knows which messages are (still) configured.
	Actors	CSO, CSMS, Charging Station
	Scenario description	**1.** The CSO asks the CSMS to retrieve all messages. **2.** The CSMS sends a GetDisplayMessagesRequest message to the Charging Station. **3.** The Charging Station responds with a GetDisplayMessagesResponse *Accepted*, indicating it has configured messages and will send them. **4.** The Charging Station sends one or more NotifyDisplayMessagesRequest messages to the CSMS (depending on the amount of messages to be sent). **5.** The CSMS responds to every notify with a NotifyDisplayMessagesResponse message.
5	Prerequisites	There is at least one message configured in the Charging Station
6	Postcondition(s)	n/a

Figure 142. Get All DisplayMessages sequence diagram

7	Error Handling	n/a
8	Remarks	Only messages configured via OCPP can be retrieved via a GetDisplayMessagesRequest.

O03 - Get All DisplayMessages - Requirements

Table 239. O03 - Get All DisplayMessage IDs - Requirements

ID	Precondition	Requirement definition
O03.FR.01	When all fields except *requestId* in a GetDisplayMessagesRequest are omitted AND at least one display message is configured.	The Charging Station SHALL respond with *Accepted*.

ID	Precondition	Requirement definition
O03.FR.02	O03.FR.01	The Charging Station SHALL send all configured DisplayMessages via NotifyDisplayMessagesRequest.
O03.FR.03	O03.FR.02 AND There are more DisplayMessages than the Charging Station can send in 1 NotifyDisplayMessagesRequest	The Charging Station SHALL split the DisplayMessages over multiple NotifyDisplayMessagesRequest messages.
O03.FR.04	O03.FR.03	The Charging Station SHALL set the *tbc* field is *true* in every NotifyDisplayMessagesRequest messages, except the last.
O03.FR.05	O03.FR.04	The Charging Station SHALL set the *requestId* field to the same value as the *requestId* in the GetDisplayMessagesRequest.
O03.FR.06	When NO DisplayMessages are configured	The Charging Station SHALL respond with *Unknown*.

O04 - Get Specific DisplayMessages

Table 240. O04 - Get a Specific DisplayMessages

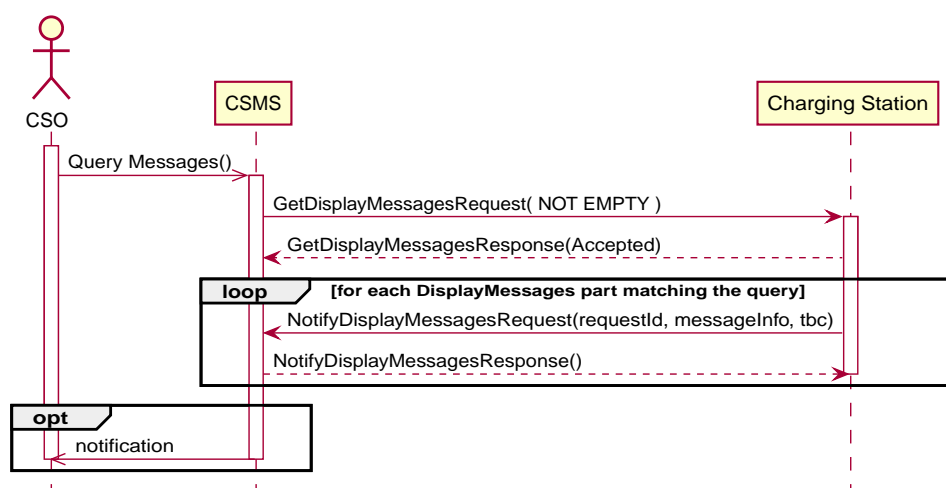| No.	Type	Description
1	**Name**	Get Specific DisplayMessages
2	**ID**	O04
	Functional block	O. DisplayMessage
3	**Objectives**	Enable a CSO to retrieve one or more specific DisplayMessages, currently configured in a Charging Station.
4	**Description**	This use case describes how a CSO can request/query for (specific) DisplayMessage, configured via OCPP in a Charging Station. The Charging Station can remove messages when they are out-dated, or transactions have ended. It can be very useful for a CSO to be able query the Charging Station for installed DisplayMessages, so the CSO known which messages are (still) configured.
	Actors	CSO, CSMS, Charging Station
	Scenario description	**1.** The CSO asks the CSMS to query for DisplayMessages. **2.** The CSMS sends a GetDisplayMessagesRequest message with the query parameters to the Charging Station. **3.** When the Charging Station has DisplayMessages that match the requested parameters, it responds with GetDisplayMessagesResponse *Accepted*. **4.** The Charging Station sends one or more NotifyDisplayMessagesRequest message to the CSMS (depending on the amount of messages to be send). **5.** The CSMS response every notify with a NotifyDisplayMessagesResponse message.
5	**Prerequisites**	There is a message with the given id configured in the Charging Station
6	**Postcondition(s)**	n/a

Figure 143. Get a specific DisplayMessages sequence diagram

7	**Error Handling**	n/a
8	**Remarks**	Only message configured via OCPP can be retrieved via GetDisplayMessagesRequest.

O04 - Get Specific DisplayMessage - Requirements

Table 241. O04 - Get Specific DisplayMessages - Requirements

ID	Precondition	Requirement definition
O04.FR.01	When one or more of the fields in a GetDisplayMessagesRequest are used AND The Charging Station has DisplayMessages configured that match the parameters in the request	The Charging Station SHALL respond with *Accepted*.

ID	Precondition	Requirement definition
O04.FR.02	When one or more of the fields in a GetDisplayMessagesRequest are used AND The Charging Station has NO DisplayMessages configured that match the parameters in the request	The Charging Station SHALL respond with *Unknown*.
O04.FR.03	O04.FR.01	The Charging Station SHALL send all configured DisplayMessages via NotifyDisplayMessagesRequest.
O04.FR.04	O04.FR.03 AND There are more DisplayMessages than the Charging Station can send in 1 NotifyDisplayMessagesRequest	The Charging Station SHALL split the DisplayMessages over multiple NotifyDisplayMessagesRequest messages.
O04.FR.05	O04.FR.04	The Charging Station SHALL set the *tbc* field is *true* in every NotifyDisplayMessagesRequest messages, except the last.
O04.FR.06	O04.FR.05	The Charging Station SHALL set the *requestId* field to the same value as the *requestId* in the GetDisplayMessagesRequest.
O04.FR.07	When NO DisplayMessages are configured	The Charging Station SHALL respond with *Unknown*.

O05 - Clear a DisplayMessage

Table 242. O05 - Clear a DisplayMessage

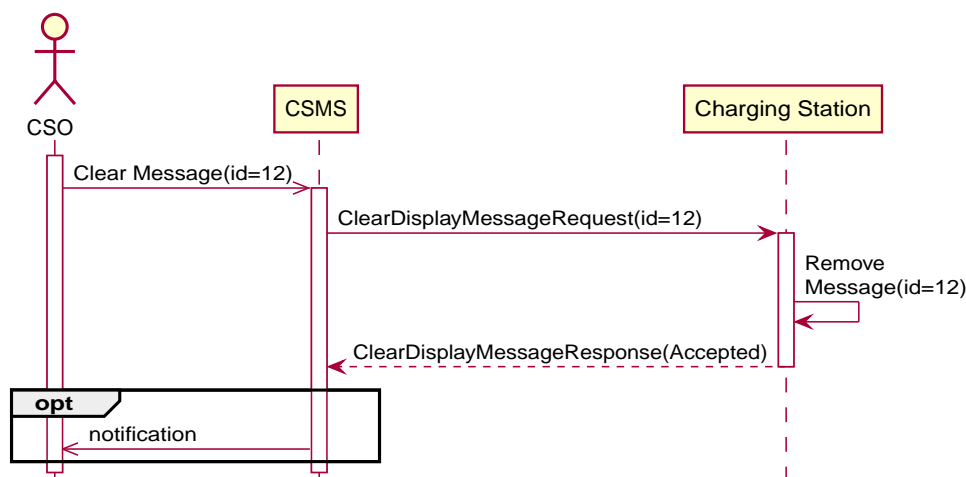| No.	Type	Description
1	**Name**	Clear a DisplayMessage
2	**ID**	O05
	Functional block	O. DisplayMessage
3	**Objectives**	Enable a CSO to remove a specific message, currently configured in a Charging Station.
4	**Description**	This use case describes how a CSO can remove a specific message, configured via OCPP in a Charging Station.
	Actors	CSO, CSMS, Charging Station
	Scenario description	**1.** The CSO asks the CSMS to remove a specific message. **2.** The CSMS sends a ClearDisplayMessageRequest message with the id of the specific message to the Charging Station. **3.** The Charging Station removes the message. **4.** The Charging Station response by sending a ClearDisplayMessageResponse message to the CSMS.
5	**Prerequisites**	There is a message with the given id configured in the Charging Station
6	**Postcondition(s)**	The message with the given id is removed from the Charging Station

Figure 144. Clear a DisplayMessage sequence diagram

7	**Error Handling**	n/a
8	**Remarks**	Only messages configured via OCPP can be cleared/removed via ClearDisplayMessageRequest

O05 - Clear a DisplayMessage - Requirements

Table 243. O05 - Clear a DisplayMessage - Requirements

ID	Precondition	Requirement definition
O05.FR.01	When a Charging Station receives a ClearDisplayMessageRequest AND there is a message configured in the Charging Station with that id	The Charging Station SHALL respond with a ClearDisplayMessageResponse message with status: *Accepted*.
O05.FR.02	When a Charging Station receives a ClearDisplayMessageRequest AND there is no message configured in the Charging Station with the given id	The Charging Station SHALL respond with a ClearDisplayMessageResponse message with status: *Unknown*.

O06 - Replace DisplayMessage

Table 244. O06 - Replace DisplayMessage

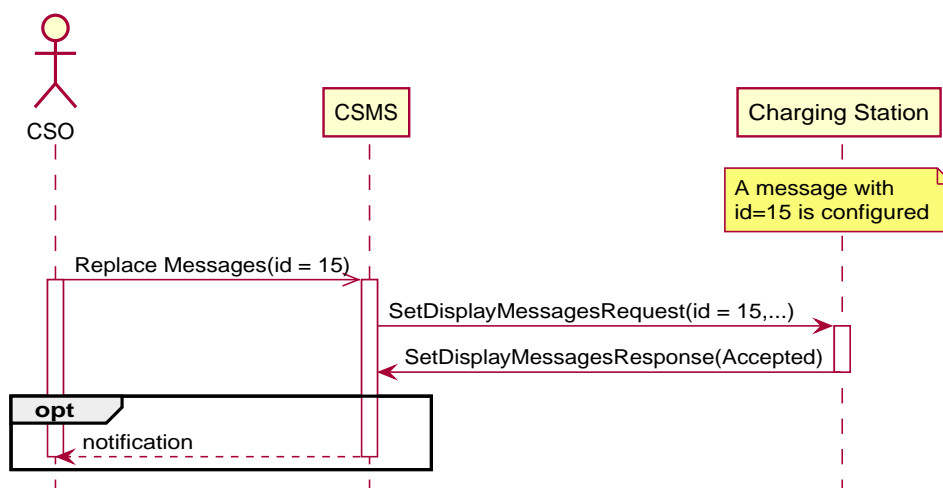| No.	Type	Description
1	Name	Replace DisplayMessage
2	ID	O06
	Functional block	O. DisplayMessage
3	Objectives	Enable a CSO to replace DisplayMessages, already configured on a Charging Station.
4	Description	This use case describes how a CSO can replace a DisplayMessage that is previously configured in a Charging Station. Replace the message content, but also all the given parameters with the new one.
	Actors	CSO, CSMS, Charging Station
	Scenario description	**1.** The CSO asks the CSMS to replace an existing DisplayMessage. **2.** The CSMS sends a SetDisplayMessageRequest message to the Charging Station with the a DisplayMessage with the same ID as already configured in the Charging Station. **3.** The Charging Station accepts the request by sending a SetDisplayMessageResponse message to the CSMS. **4.** The Charging Station shows the updated/replaced message on the display at the configured moment.
	Alternative scenario's	O001 - Set DisplayMessage and O002 - Set DisplayMessage for Transaction
5	Prerequisites	There is a message with the same id configured in the Charging Station
6	Postcondition(s)	The DisplayMessage is replaced by the one provided with the same ID.

Figure 145. Replace DisplayMessage sequence diagram

7	Error Handling	n/a
8	Remarks	n/a

O06 - Replace DisplayMessage - Requirements

Table 245. O06 - Replace DisplayMessage - Requirements

ID	Precondition	Requirement definition
O06.FR.01	When a Charging Station receives a SetDisplayMessageRequest AND there is a message configured in the Charging Station with the same id	The Charging Station SHALL replace the existing message with the new message (including all the new parameters) AND respond with a SetDisplayMessageResponse message with status: *Accepted* for this message.