N. Diagnostics

1. Introduction

This Functional Block describes the diagnostics functionality of OCPP. This functionality enables remote diagnostics of problems with a Charging Station. A Charging Station can be requested to upload a file with diagnostics information (optionally limited to a specified interval).

2. Use cases & Requirements

2.1. Logging

N01 - Retrieve Log Information

Table 214. N01 - Retrieve Log Information

No.	Type	Description
1	**Name**	Retrieve Log
2	**ID**	N01
	Functional block	N. Diagnostics
3	**Objective(s)**	To enable the CSMS retrieving of log information from a Charging Station.
4	**Description**	This use case covers the functionality of getting log information from a Charging Station. The CSMS can request a Charging Station to upload a file with log information to a given location (URL). The format of this log file is not prescribed. The Charging Station uploads a log file and gives information about the status of the upload by sending status notifications to the CSMS.
	Actors	Charging Station, CSMS
	Scenario description	**1.** The CSMS sends a GetLogRequest to the Charging Station. **2.** The Charging Station responds with a GetLogResponse. **3.** The Charging Station sends a LogStatusNotificationRequest with the status `Uploading` **4.** The CSMS responds with a LogStatusNotificationResponse acknowledging the status update request. **5.** Uploading of the diagnostics files. **6.** The Charging Station sends LogStatusNotificationRequest with the status `Uploaded`. **7.** The CSMS responds with LogStatusNotificationResponse, acknowledging the status update request.
5	**Prerequisite(s)**	- Diagnostics information is available for upload. - URL to upload file to is reachable and exists.
6	**Postcondition(s)**	**Successful postcondition:** Log file successfully uploaded. **Failure postcondition:** Log file not successfully uploaded and failed.

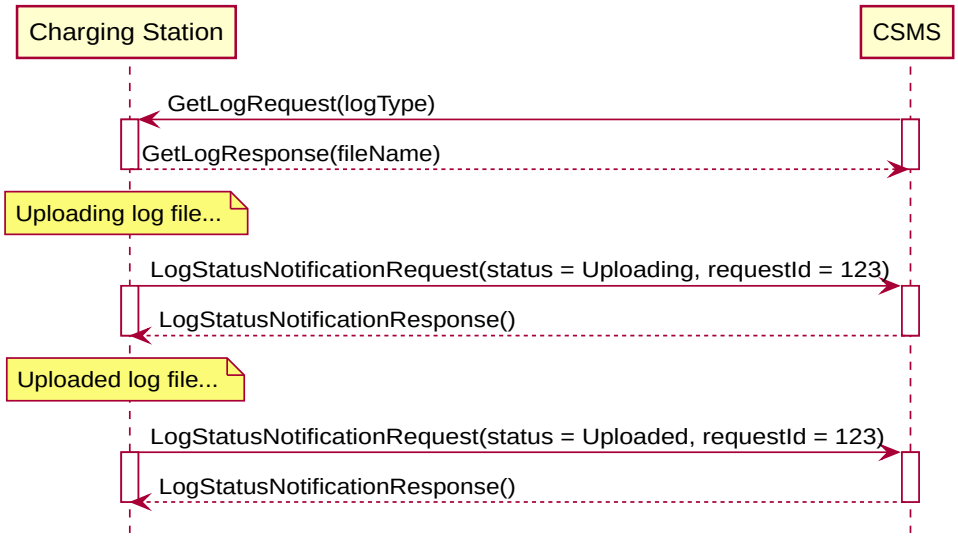

Figure 130. Sequence Diagram: Get Diagnostics

7	**Error handling**	When the upload fails and the transfer protocol supports "resume" the Charging Station is RECOMMENDED to try to resume before aborting the upload.

8	**Remark(s)**	As an example in this use case the requestId = 123, but this could be any value. When a Charging Station is requested to upload a log file, the CSMS supplies in the request an URL where the Charging Station SHALL upload the file. The URL also contains the protocol which must be used to upload the file. It is recommended that the log file is uploaded via FTP or FTPS. FTP(S) is better optimized for large binary data than HTTP. Also FTP(S) has the ability to resume uploads. In case an upload is interrupted, the Charging Station can resume uploading after the part it already has uploaded. The FTP URL is of format: *ftp://User:password@host:port/path* in which the parts *User:password@*, *:password* or *:port* may be excluded. The Charging Station has a required Configuration Variable that reports which file transfer protocols it supports: `FileTransferProtocols` The format of the log file is not prescribed. FTP needs to be able to use Passive FTP, to be able to transverse over as much different typologies as possible.

N01 - Retrieve Log Information - Requirements

Table 215. N01 - Requirements

ID	Precondition	Requirement definition	Note
N01.FR.01	Upon receipt of a GetLogRequest AND if the requested log information is available	The Charging Station SHALL respond with a GetLogResponse stating the name of the file and status *Accepted*.	
N01.FR.02	N01.FR.01	The Charging Station SHALL start uploading a single log file to the specified location	
N01.FR.03	N01.FR.02 AND The GetLogRequest contained logType *SecurityLog*	The Charging Station SHALL upload its security log	
N01.FR.04	N01.FR.02 AND The GetLogRequest contained logType *DiagnosticsLog*	The Charging Station SHALL upload its diagnostics.	
N01.FR.05	Upon receipt of a GetLogRequest AND if the requested log information is NOT available	The Charging Station SHALL respond with a GetLogResponse WITH status *Rejected*.	
N01.FR.07		Every LogStatusNotificationRequest sent for a log upload SHALL contain the same requestId as the GetLogRequest that started this log upload.	
N01.FR.08	When uploading a log document is started	The Charging Station SHALL send a LogStatusNotificationRequest with status *Uploading*.	
N01.FR.09	When a log document is uploaded successfully	The Charging Station SHALL send a LogStatusNotificationRequest with status *Uploaded*.	
N01.FR.10	When uploading a log document failed	The Charging Station SHALL send a LogStatusNotificationRequest with status *UploadFailed*, *BadMessage*, *PermissionDenied* OR *NotSupportedOperation*.	It is RECOMMENDED to send a status that describes the reason of failure as precise as possible.
N01.FR.12	When a Charging Station is assembling or uploading the log file AND the Charging Station receives a new GetLogRequest	The Charging Station SHOULD cancel the ongoing log file upload AND respond with status *AcceptedCanceled*.	

ID	Precondition	Requirement definition	Note
N01.FR.13		The field requestId in LogStatusNotificationRequest is mandatory, unless the message was triggered by a TriggerMessageRequest AND there is no log upload ongoing.	

2.2. Configure Monitoring

NOTE For managing the monitoring of a Charging Station a basic understanding of Device Model concepts is essential. These concepts are explained in "OCPP 2.0.1: Part 1 - Architecture & Topology", chapter 4.

N02 - Get Monitoring report

Table 216. N02 - Get Monitoring Report

No.	Type	Description
1	**Name**	Get Monitoring Report
2	**ID**	N02
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the CSMS the ability to retrieve a report about configured monitoring settings per component and variable.
4	**Description**	This use case describes how the CSMS requests the Charging Station to send a report about configured monitoring settings per component and variable. Optionally, this list can be filtered on monitoringCriteria and componentVariables.
	Actors	Charging Station, CSMS, CSO
	Scenario description	**1.** The CSO triggers the CSMS to request a monitoring report from a Charging Station. **2.** The CSMS sends a GetMonitoringReportRequest to the Charging Station. **3.** The Charging Station responds with a GetMonitoringReportResponse. **4.** The Charging Station sends a NotifyMonitoringReportRequest to the CSMS. **5.** The CSMS responds with a NotifyMonitoringReportResponse. **6.** Steps #4 and #5 are repeated until all data of the monitoring report has been sent.
5	**Prerequisite(s)**	Charging Station supports Monitoring
6	**Postcondition(s)**	The CSMS received a report about the configured monitoring settings.

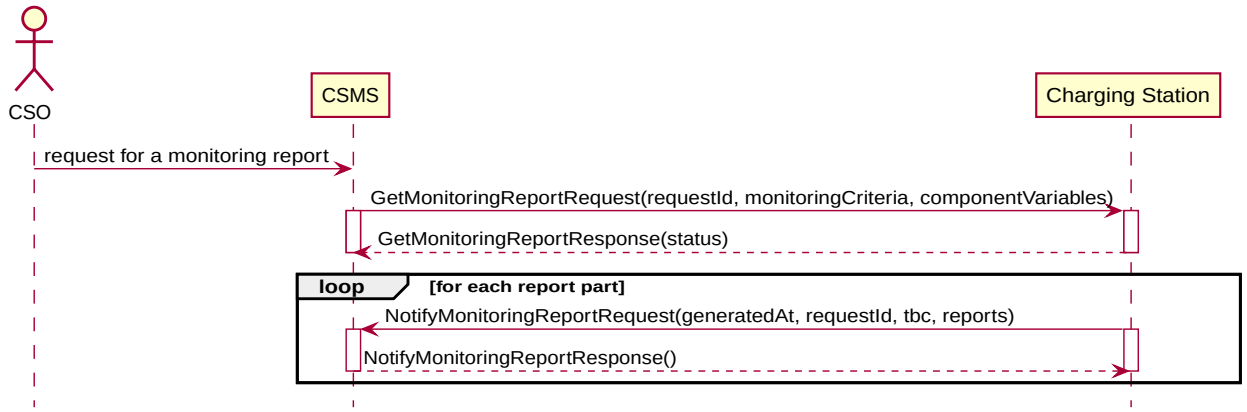

Figure 131. Sequence Diagram: Get Monitoring Report

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N02 - Get Monitoring Report - Requirements

Table 217. N02 - Requirements

ID	Precondition	Requirement definition
N02.FR.01	When the Charging Station receives a getMonitoringReportRequest for supported *monitoringCriteria* OR without *monitoringCriteria*	The Charging Station SHALL send a getMonitoringReportResponse with Accepted.
N02.FR.02	When the Charging Station receives a getMonitoringReportRequest for not supported *monitoringCriteria*	The Charging Station SHALL send a getMonitoringReportResponse with NotSupported.
N02.FR.03	N02.FR.01	The Charging Station SHALL send the requested information via one or more notifyMonitoringReportRequest messages to the CSMS.
N02.FR.04	N02.FR.01 AND The getMonitoringReportRequest contained a *requestId*	Every notifyMonitoringReportRequest sent for this getMonitoringReportRequest SHALL contain the same *requestId*.
N02.FR.05	N02.FR.01 AND *monitoringCriteria* and *componentVariables* are NOT both empty.	The set of monitors reported in one or more notifyMonitoringReportRequest messages is limited to the set defined by *monitoringCriteria* and *componentVariables*.
N02.FR.06	N02.FR.01 AND *monitoringCriteria* is NOT empty AND *componentVariables* is empty.	The set of monitors reported in one or more notifyMonitoringReportRequest messages is limited to the set defined by *monitoringCriteria*.
N02.FR.07		The maximum number of *componentVariables* in one getMonitoringReportRequest message is given by the `ItemsPerMessageGetReport` Configuration Variable
N02.FR.08	N02.FR.01 AND *monitoringCriteria* is absent AND *componentVariables* is NOT empty.	The set of monitors reported in one or more notifyMonitoringReportRequest messages is limited to the set defined by *componentVariables*.
N02.FR.09		The sequence number contained in the seqNo field of the NotifyMonitoringReportRequest is incremental per report. So the NotifyMonitoringReportRequest message which contains the first report part, SHALL have a seqNo with value *0*.
N02.FR.10	When the Charging Station receives a GetMonitoringReportRequest with a combination of criteria which results in an empty result set.	The Charging Station SHALL respond with a GetMonitoringReportResponse(*status*=`EmptyResultSet`).
N02.FR.11	N02.FR.01 AND *monitoringCriteria* is empty AND *componentVariables* is empty.	The set of all existing monitors is reported in one or more notifyMonitoringReportRequest messages.
N02.FR.12	If *monitoringCriteria* contains `ThresholdMonitoring`	All monitors with *type* = `UpperThreshold` or *type* = `LowerThreshold` are reported.
N02.FR.13	If *monitoringCriteria* contains `DeltaMonitoring`	All monitors with *type* = `Delta` are reported.
N02.FR.14	If *monitoringCriteria* contains `PeriodicMonitoring`	All monitors with *type* = `Periodic` or *type* = `PeriodicClockAligned` are reported.

N03 - Set Monitoring Base

Table 218. N03 - Set Monitoring Base

No.	Type	Description
1	**Name**	Set Monitoring Base
2	**ID**	N03
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the CSMS the ability to request the Charging Station to activate a set of preconfigured monitoring settings, as denoted by the value of **MonitoringBase**.
4	**Description**	This use case describes how the CSMS requests the Charging Station to activate a set of preconfigured monitoring settings, as denoted by the value of **MonitoringBase**. It is up to the manufacturer of the Charging Station to define which monitoring settings are activated by All, FactoryDefault and HardWiredOnly.
	Actors	Charging Station, CSMS, CSO

No.	Type	Description
	Scenario description	**1.** The CSO triggers the CSMS to request a Charging Station to set a monitoring base. **2.** The CSMS sends a SetMonitoringBaseRequest to the Charging Station. **3.** The Charging Station responds with a SetMonitoringBaseResponse.
5	**Prerequisite(s)**	Charging Station supports Monitoring
6	**Postcondition(s)**	The Charging Station activated the set of monitoring settings, as denoted by the value of **MonitoringBase**.

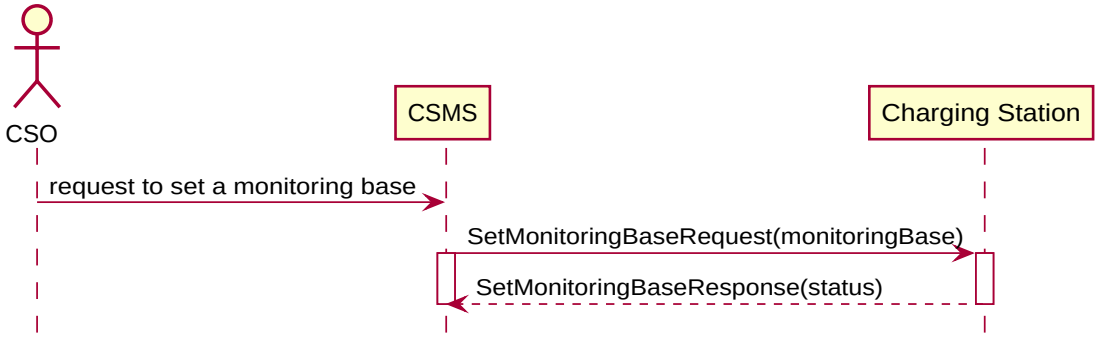

Figure 132. Sequence Diagram: Set Monitoring Base

7	**Error handling**	n/a
8	**Remark(s)**	Note, that upon receipt of a SetMonitoringBaseRequest the Charging Station will discard of any previously configured monitoring settings and will activate the monitoring settings that are related to the MonitoringBase.

N03 - Set Monitoring Base - Requirements

Table 219. N03 - Requirements

ID	Precondition	Requirement definition
N03.FR.01	When the Charging Station accepts a setMonitoringBaseRequest	Then the Charging Station SHALL send a setMonitoringBaseResponse with Accepted.
N03.FR.02	When the Charging Station receives a setMonitoringBaseRequest for a not supported *monitoringBase*	Then the Charging Station SHALL send a setMonitoringBaseResponse with NotSupported.
N03.FR.03	N03.FR.01 AND When the Charging Station received a setMonitoringBaseRequest with *monitoringBase* All	Then the Charging Station SHALL activate all preconfigured monitoring.
N03.FR.04	N03.FR.01 AND When the Charging Station received a setMonitoringBaseRequest with *monitoringBase* FactoryDefault	Then the Charging Station SHALL activate the default monitoring settings as recommended by the manufacturer.
N03.FR.05	N03.FR.01 AND When the Charging Station received a setMonitoringBaseRequest with *monitoringBase* HardWiredOnly	Then the Charging Station SHALL clear all custom and disable all pre-configured monitors. Only hard-wired monitors remain active.

N04 - Set Variable Monitoring

Table 220. N04 - Set Variable Monitoring

No.	Type	Description
1	**Name**	Set Variable Monitoring
2	**ID**	N04
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the CSMS the ability to request the Charging Station to set monitoring triggers on Variables.

No.	Type	Description
4	**Description**	This use case describes how the CSMS requests the Charging Station to set monitoring triggers on Variables. Multiple triggers can be set for upper or lower thresholds, delta changes or periodic reporting.
	Actors	Charging Station, CSMS, CSO
	Scenario description	**1.** The CSO triggers the CSMS to request a Charging Station to set a variable monitoring setting. **2.** The CSMS sends a SetVariableMonitoringRequest to the Charging Station. **3.** The Charging Station responds with a SetVariableMonitoringResponse.
5	**Prerequisite(s)**	Charging Station supports Monitoring The specific Variable supports Monitoring
6	**Postcondition(s)**	The Charging Station activated the set of monitoring triggers on the Variables.

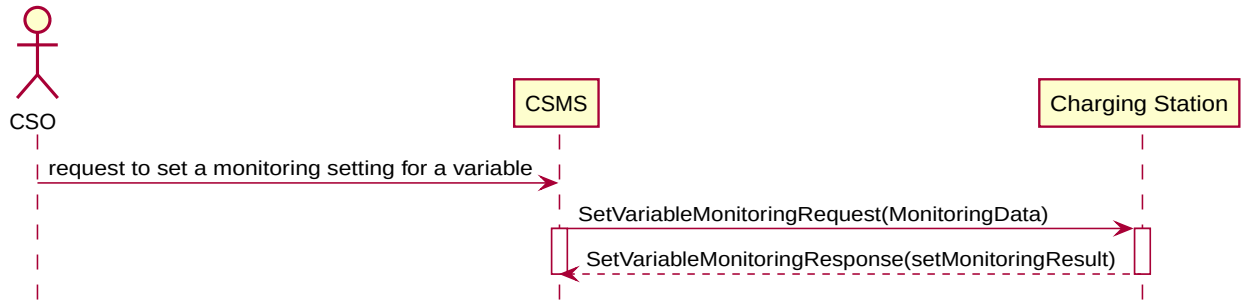

Figure 133. Sequence Diagram: Set Variable Monitoring

7	**Error handling**	n/a
8	**Remark(s)**	All variableMonitoring settings are persistent across reboot. A variableMonitoring setting is persistent after a firmware update, if the monitored variable still exists and it is still monitor-able. Otherwise the variableMonitoring setting is removed.

N04 - Set Variable Monitoring - Requirements

Table 221. N04 - Requirements

ID	Precondition	Requirement definition	Note
N04.FR.01	When the Charging Station receives a SetVariableMonitoringRequest with an X number of SetMonitoringData elements	The Charging Station SHALL respond with an SetVariableMonitoringResponse with an equal (X) number of SetMonitoringResult elements, one for every SetMonitoringData element in the SetVariableMonitoringRequest.	
N04.FR.02	N04.FR.01	Every SetMonitoringResult element in the SetVariableMonitoringResponse SHALL contain the same *component* and *variable* combination as one of the SetVariableMonitoringRequest elements in the SetVariableMonitoringRequest.	
N04.FR.03	When the Charging Station receives a SetVariableMonitoringRequest with an unknown Component in SetMonitoringData	The Charging Station SHALL set the *attributeStatus* field in the corresponding SetMonitoringResult to: UnknownComponent.	
N04.FR.04	When the Charging Station receives a SetVariableMonitoringRequest with a Variable that is unknown for the given Component in SetMonitoringData	The Charging Station SHALL set the *attributeStatus* field in the corresponding SetMonitoringResult to: UnknownVariable.	
N04.FR.05	When the Charging Station receives a SetVariableMonitoringRequest with an MonitorType which is not supported by the specific Variable	The Charging Station SHALL set the *attributeStatus* field in the corresponding SetMonitoringResult to: NotSupportedMonitorType.	
N04.FR.06	When the Charging Station receives a SetVariableMonitoringRequest with monitor type UpperThreshold or LowerThreshold AND the *monitorValue* is lower or higher than the range of the given Variable	The Charging Station SHALL set the attributeStatus field in the corresponding SetMonitoringResult to: Rejected.	More information can be provided in the optional *statusInfo* element.

ID	Precondition	Requirement definition	Note
N04.FR.07	When the Charging Station receives a SetVariableMonitoringRequest for a monitor that conflicts with safety requirements.	The Charging Station MAY set the *attributeStatus* field in the corresponding SetMonitoringResult to: Rejected.	e.g. when the requested monitoring overrides factory set security monitoring.
N04.FR.08	When the Charging Station was able to set the given *monitorValue* in the SetMonitoringData	The Charging Station SHALL set the *attributeStatus* field in the corresponding SetMonitoringResult to: Accepted.	Please refer to use case N07 - Alert Event on how to handle the different monitor types .
N04.FR.09		The maximum size and number of items of *monitoringData* in one SetVariableMonitoringRequest message is determined by the `ItemsPerMessageSetVariableMonitoring` and `BytesPerMessageSetVariableMonitoring` Configuration Variables.	
N04.FR.10	When the Charging Station receives a SetVariableMonitoringRequest with a type/severity combination for which a monitor already exists.	The Charging Station SHALL set the *attributeStatus* field in the corresponding SetMonitoringResult to: Duplicate.	There cannot be two monitors of the same type with the same severity. E.g. with an UpperThreshold at value "67" and severity "4-Error" there cannot be another Upperthreshold at value "78" with same severity "4-Error" defined. Also it is only possible to replace a monitor on Id.
N04.FR.11	When the Charging Station receives a SetVariableMonitoringRequest without an Id	The Charging Station will generate an Id and return it in the SetVariableMonitoringResponse.	
N04.FR.12	When the Charging Station receives a SetVariableMonitoringRequest with an Id AND A monitor exists matching the given Id AND The given Component/Variable combination corresponds with the existing VariableMonitor.	The Charging Station SHALL replace the monitor.	
N04.FR.13	When the Charging Station receives a SetVariableMonitoringRequest with an Id AND No monitor exists matching the given Id.	The Charging Station SHALL set the attributeStatus field in the corresponding SetMonitoringResult to: Rejected.	
N04.FR.14	When the Charging Station receives a SetVariableMonitoringRequest with type Delta and value contains a negative value.	The Charging Station SHALL set the attributeStatus field in the corresponding SetMonitoringResult to: Rejected.	More information can be provided in the optional *statusInfo* element.
N04.FR.15	N04.FR.12 AND The replaced VariableMonitor belonged to the 'PreconfiguredMonitors'.	The new VariableMonitor shall be classified as a 'CustomMonitor', until reset by a SetMonitoringBaseRequest.	
N04.FR.16	When the Charging Station receives a SetVariableMonitoringRequest AND the given Component/Variable combination does NOT correspond with the existing VariableMonitor.	The Charging Station SHALL respond with *Rejected* AND NOT replace the VariableMonitor.	It is not allowed to change Variable or Component of a monitor.
N04.FR.17	When the CSMS sends a SetVariableMonitoringRequest with type Delta for a Variable that is NOT of a numeric type	It is RECOMMENDED to use a *monitorValue* of 1.	*monitorValue* is irrelevant for non-numeric types (e.g. any type except decimal or integer), since the monitor is triggered by every change of the Variable.

N05 - Set Monitoring Level

Table 222. N05 - Set Monitoring Level

No.	Type	Description
1	**Name**	Set Monitoring Level
2	**ID**	N05
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the CSMS the ability to request the Charging Station to restrict the reporting of monitoring events by NotifyEventRequest to only those monitors with a severity number lower than or equal to a certain severity.
4	**Description**	It may be desirable to restrict the reporting of monitoring events, to only those monitors with a severity number lower than or equal to a certain severity. For example when the data-traffic between Charging Station and CSMS needs to limited for some reason. The CSMS can control which events it will to be notified of by the Charging Station with the SetMonitoringLevelRequest message.
	Actors	Charging Station, CSMS, CSO
	Scenario description	**1.** The CSO triggers the CSMS to request a Charging Station to restrict the reporting of monitoring events, by setting a severity level limit. **2.** The CSMS sends a SetMonitoringLevelRequest to the Charging Station. **3.** The Charging Station responds with a SetMonitoringLevelResponse.
5	**Prerequisite(s)**	Charging Station supports Monitoring
6	**Postcondition(s)**	The Charging Station restricted the reporting of monitoring events by NotifyEventRequest to only those wanted by the user.

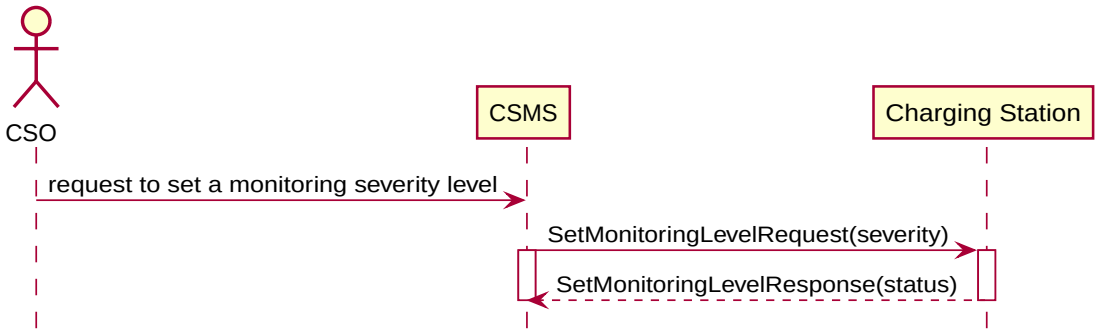

Figure 134. Sequence Diagram: Set Monitoring Level

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N05 - Set Monitoring Level - Requirements

Table 223. N05 - Requirements

ID	Precondition	Requirement definition
N05.FR.01	When the Charging Station accepts a setMonitoringLevelRequest	The Charging Station SHALL send a setMonitoringLevelResponse with Accepted.
N05.FR.02	When the Charging Station receives a setMonitoringLevelRequest for a *severity* that is out of range	The Charging Station SHALL send a setMonitoringLevelResponse with Rejected.
N05.FR.03	N05.FR.01	The Charging Station SHALL restrict the reporting of monitoring events by NotifyEventRequest to only those monitors with a severity number lower than or equal to the given severity.

N06 - Clear / Remove Monitoring

Table 224. N06 - Clear / Remove Monitoring

No.	Type	Description
1	**Name**	Clear / Remove Monitoring
2	**ID**	N06
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the CSMS the ability to clear / remove monitoring settings.
4	**Description**	A monitoring setting can be cleared (removed) by sending a ClearVariableMonitoringRequest with the id of the monitoring setting.
	Actors	Charging Station, CSMS, CSO
	Scenario description	**1.** The CSO triggers the CSMS to request clearing/removing one or more variables in a Charging Station. **2.** The CSMS sends a ClearVariableMonitoringRequest to the Charging Station. **3.** The Charging Station responds with a ClearVariableMonitoringResponse.
5	**Prerequisite(s)**	Charging Station supports Monitoring
6	**Postcondition(s)**	The Charging Station cleared / removed the requested monitoring settings.

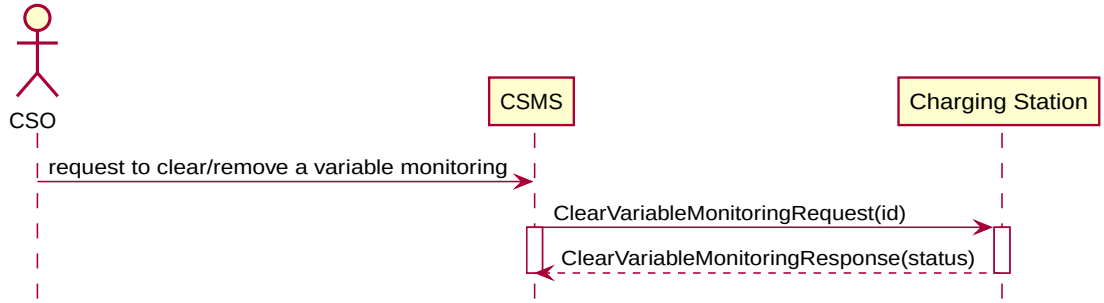

Figure 135. Sequence Diagram: Clear / Remove Monitoring

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N06 - Clear / Remove Monitoring - Requirements

Table 225. N06 - Requirements

ID	Precondition	Requirement definition
N06.FR.01	When the Charging Station accepts a ClearVariableMonitoringRequest	The Charging Station SHALL send a ClearVariableMonitoringResponse with Accepted.
N06.FR.02	When the Charging Station receives a ClearVariableMonitoringRequest with a non existing *id*	The Charging Station SHALL send a ClearVariableMonitoringResponse with NotFound.
N06.FR.03	When the Charging Station receives a ClearVariableMonitoringRequest for an *id* referring to a monitor that cannot be cleared (for example because it is hardcoded).	The Charging Station SHALL send a ClearVariableMonitoringResponse with Rejected.
N06.FR.04		The CSMS SHALL NOT put more *id* elements in a ClearVariableMonitoringRequest than reported by the Charging Station via: `ItemsPerMessageClearVariableMonitoring` and `BytesPerMessageClearVariableMonitoring`.
N06.FR.05		For every *id* in a ClearVariableMonitoringRequest the CSMS SHALL add a *clearMonitoringResult* element to the ClearVariableMonitoringResponse send to the CSMS.

2.3. Monitoring Events

N07 - Alert Event

Table 226. N07 - Alert Event

No.	Type	Description
1	**Name**	Alert Event
2	**ID**	N07
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the Charging Station the ability to notify the CSMS about monitoring events.
4	**Description**	NotifyEventRequest reports every Component/Variable for which a VariableMonitoring setting was triggered. Only the VariableMonitoring settings that are responsible for triggering an event are included.
	Actors	Charging Station, CSMS
	Scenario description	**1.** If a threshold or a delta value has exceeded, the Charging Station sends a NotifyEventRequest to the CSMS. **2.** The CSMS responds with a NotifyEventResponse.
5	**Prerequisite(s)**	The Charging Station has active monitoring settings. The monitoring setting(s) might have been configured explicitly via a SetVariableMonitoring message or it might be "hard-wired" in the Charging Station's firmware.
6	**Postcondition(s)**	The Charging Station notified the CSMS about the monitoring events.

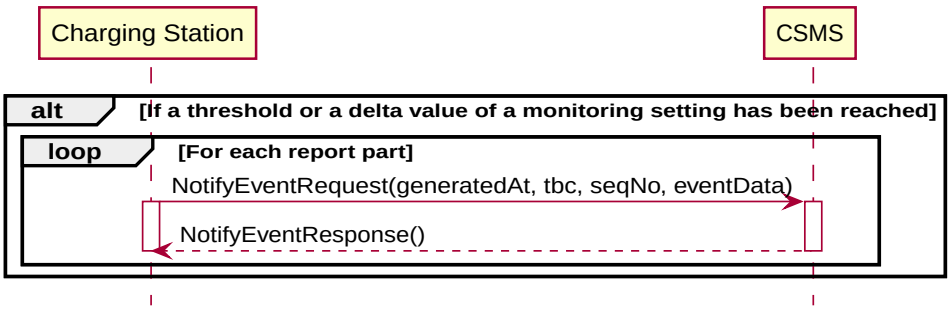

Figure 136. Sequence Diagram: Alert Event

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N07 - Alert Event - Requirements

Table 227. N07 - Requirements

ID	Precondition	Requirement definition
N07.FR.02	When a monitored value returns to within the set *UpperThreshold* or *LowerThreshold*	The Charging Station SHALL send a NotifyEventRequest with an eventData with the attribute *cleared* is true.
N07.FR.03	When the CSMS receives an notifyEventRequest	The CSMS SHALL respond with an empty NotifyEventResponse.
N07.FR.04	When a monitor is triggered AND The severity number of the monitor is equal to or lower than the severity number set in the Configuration Variable `OfflineMonitoringEventQueueingSeverity` AND The Charging Station is *offline*	The Charging Station SHALL queue this NotifyEventRequest and deliver it when it is back online.
N07.FR.05	When a monitor is triggered AND another event caused this event	The Charging Station MAY include the *eventId* of the other event in the *cause* field of the eventData element in the NotifyEventRequest message.
N07.FR.06	When a monitor is triggered	An eventData element in a NotifyEventRequest SHALL contain the Component, Variable and variableMonitoring data that caused the event.
N07.FR.07	When a monitor is triggered	The Charging Station SHALL set the *seqNo* of the first NotifyEventRequest sent for this event to 0.
N07.FR.10	When a monitor is triggered AND A variableMonitoring setting has been set on a write-only variable.	The actualField of the NotifyEventRequest SHALL be empty.

ID	Precondition	Requirement definition
N07.FR.11	When modifying a set *UpperThreshold* or *LowerThreshold* VariableMonitor.	The Charging Station SHALL check if the new threshold clears the old threshold OR if the new threshold is exceeded by the monitored value.
N07.FR.12	When removing a set *UpperThreshold* or *LowerThreshold* VariableMonitor AND the threshold was exceeded.	The Charging Station SHALL NOT send a NotifyEventRequest with an eventData with the attribute *cleared* is true.
N07.FR.13		A VariableMonitoring needs to be stored persistently across reboots.
N07.FR.14	N07.FR.08 AND A reboot occurred AND After the reboot the *UpperThreshold* or *LowerThreshold* is cleared.	The Charging Station SHALL send a NotifyEventRequest with an eventData with the attribute *cleared* is true.
N07.FR.15	When a monitor is triggered AND The *severity* of the monitor is greater than the monitoring severity level set in a SetMonitoringLevelRequest by the CSMS (see use case N05 - Set Monitoring Level)	The Charging Station SHALL NOT send a NotifyEventRequest for the triggered monitor.
N07.FR.16	When there is a monitor with type UpperThreshold on a Component/Variable combination AND the Actual value (attributeType Actual) of the Variable exceeds *monitorValue*	The Charging Station SHALL send a NotifyEventRequest with *trigger* Alerting for the triggered monitor.
N07.FR.17	When there is a monitor with type LowerThreshold on a Component/Variable combination AND the Actual value (attributeType Actual) of the Variable drops below *monitorValue*	The Charging Station SHALL send a NotifyEventRequest with *trigger* Alerting for the triggered monitor.
N07.FR.18	When there is a monitor with type Delta on a Component/Variable combination AND the Variable is of a numeric type AND the Actual value (attributeType Actual) of the Variable has changed more than plus or minus *monitorValue* since the time that this monitor was set or since the last time this event notice was sent, whichever was last	The Charging Station SHALL send a NotifyEventRequest with *trigger* Delta for the triggered monitor.
N07.FR.19	When there is a monitor with type Delta on a Component/Variable combination AND the Variable is NOT of a numeric type AND the Actual value (attributeType Actual) of the Variable has changed since the time that this monitor was set or since the last time this event notice was sent, whichever was last (Note: For variables that are not numeric, like boolean, string or enumerations, a monitor of type Delta will trigger an event notice whenever the variable changes, regardless of the value of *monitorValue*)	The Charging Station SHALL send a NotifyEventRequest with *trigger* Delta for the triggered monitor.
N07.FR.20	When there is a monitor with type Periodic on a Component/Variable combination AND the number of seconds specified in *monitorValue* have passed (starting from the time that this monitor was set or triggered)	The Charging Station SHALL send a NotifyEventRequest with *trigger* Periodic for the triggered monitor.
N07.FR.21	When there is a monitor with type PeriodicClockAligned on a Component/Variable combination AND the number of seconds specified by *monitorValue*, starting from the nearest clock-aligned interval after this monitor was set, have passed (For example, a *monitorValue* of 900 will trigger event notices at 0, 15, 30 and 45 minutes after the hour, every hour)	The Charging Station SHALL send a NotifyEventRequest with *trigger* Periodic for the triggered monitor.

N08 - Periodic Event

Table 228. N08 - Periodic Event

No.	Type	Description
1	**Name**	Periodic Event
2	**ID**	N08
	Functional block	N. Diagnostics
3	**Objective(s)**	To give the Charging Station the ability to notify the CSMS periodically about monitoring events.
4	**Description**	NotifyEventRequest reports every Component/Variable for which a VariableMonitoring setting was triggered. Only the VariableMonitoring settings that are responsible for triggering an event are included.
	Actors	Charging Station, CSMS
	Scenario description	**1.** If a periodic value has exceeded, the Charging Station sends a NotifyEventRequest with trigger *periodic* to the CSMS. **2.** The CSMS responds with a NotifyEventResponse.
5	**Prerequisite(s)**	The Charging Station has active monitoring settings. The monitoring setting(s) might have been configured explicitly via a SetVariableMonitoring message or it might be "hard-wired" in the Charging Station's firmware.
6	**Postcondition(s)**	The Charging Station notified the CSMS about the monitoring events.

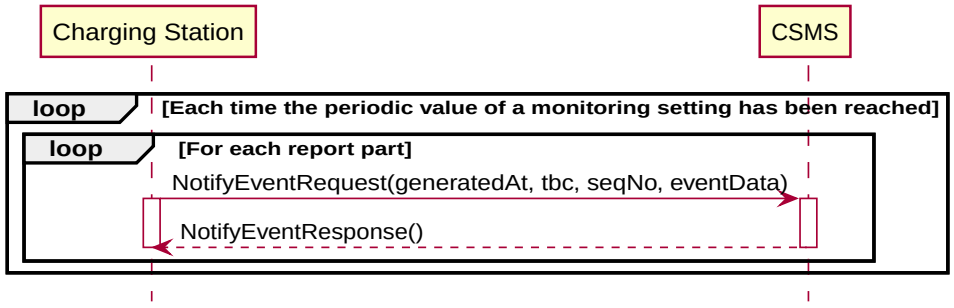

Figure 137. Sequence Diagram: Periodic Event

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N08 - Periodic Event - Requirements

Table 229. N08 - Requirements

ID	Precondition	Requirement definition
N08.FR.01	Every time a monitored value with *monitorType* periodic reaches the set *monitorValue* AND The severity number of the monitor is equal to or lower than the monitoring severity level set in a SetMonitoringLevelRequest by the CSMS (see use case N05 - Set Monitoring Level)	The Charging Station SHALL send a notifyEventRequest.
N08.FR.02	N08.FR.01 When the CSMS receives an NotifyEventRequest	The CSMS SHALL respond with an empty NotifyEventResponse.
N08.FR.03	N08.FR.01 AND The severity number of the monitor is equal to or lower than the severity number set in the Configuration Variable `OfflineMonitoringEventQueueingSeverity` AND The Charging Station is *offline*	The Charging Station SHALL queue this NotifyEventRequest and deliver it when it is back online.

ID	Precondition	Requirement definition
N08.FR.04	N08.FR.01 AND This NotifyEventRequest is the first or only report part.	The Charging Station SHALL set *seqNo* to 0.
N08.FR.05	N08.FR.01 AND When the variableMonitoring setting which triggered the event is either of type Periodic or PeriodicClockAligned	The Charging Station SHALL set *trigger* to Periodic.

2.4. Customer Information

N09 - Get Customer Information

Table 230. N09 - Get Customer Information

No.	Type	Description
1	**Name**	Get Customer Information
2	**ID**	N09
	Functional block	N. Diagnostics
3	**Objective(s)**	To enable the CSMS to retrieve raw customer information from a Charging Station.
4	**Description**	The CSMS sends a message to the Charging Station to retrieve raw customer information, for example to be compliant with local privacy laws. The Charging Station notifies the CSMS by sending one or more reports.
	Actors	Charging Station, CSMS
	Scenario description	**1.** The CSMS sends a CustomerInformationRequest with the report flag set to *true* to the Charging Station with a reference to a customer (idToken, customerCertificate or customerIdentifier). **2.** The Charging Station responds with CustomerInformationResponse, indicating whether it will send it or not. **3.** The Charging Station sends one or more NotifyCustomerInformationRequest messages to the CSMS. **4.** The CSMS responds with one or more NotifyCustomerInformationResponse messages to the Charging Station.
5	**Prerequisite(s)**	n/a
6	**Postcondition(s)**	The CSMS has *Successfully* received a CustomerInformationResponse message with status *Accepted* AND has *Successfully* received the requested data.

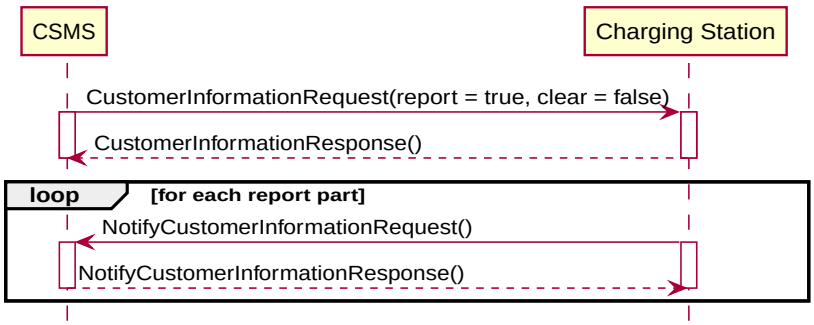

Figure 138. Sequence Diagram: Get Customer Information

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N09 - Get Customer Information - Requirements

Table 231. N09 - Requirements

ID	Precondition	Requirement definition	Note
N09.FR.01	When the CSMS wants to retrieve CustomerInformation from the Charging Station.	The report flag in the CustomerInformationRequest SHALL be set to *true*.	
N09.FR.02	When the Charging Station receives a CustomerInformationRequest AND it is in a state where it can process this request.	the Charging Station SHALL respond with a CustomerInformationResponse message with status *Accepted* .	
N09.FR.03	When the Charging Station is in a state where it cannot process this request.	On receipt of the CustomerInformationRequest the Charging Station SHALL respond with a CustomerInformationResponse with status *Rejected* .	
N09.FR.04		The CSMS SHALL include a reference to a customer by including either an idToken, customerCertificate or customerIdentifier in the CustomerInformationRequest.	
N09.FR.05	N09.FR.02 AND the Charging Station has information stored about the customer referred to by the customer identifier	The Charging Station SHALL send the requested information via one or more NotifyCustomerInformationRequest messages to the CSMS.	
N09.FR.06	N09.FR.02 AND the Charging Station has no information stored about the customer referred to by the customer identifier.	The Charging Station SHALL send one NotifyCustomerInformationRequest message to the CSMS indicating that no data was found.	
N09.FR.07	When receiving a CustomerInformationRequest with both the report flag as well as the clear flag are set to *false*	It is RECOMMENDED to respond with status a CustomerInformationResponse message with status *Rejected* .	
N09.FR.08	When requesting user information according to the *customerCertificate*	The CSMS SHALL use the *hashAlgorithm*, which was used to install the certificate.	When a new firmware is installed it is RECOMMENDED that the CSMS requests the certificate first using GetInstalledCertificateIds Request to be sure of the used *hashAlgorithm*.

N10 - Clear Customer Information

Table 232. N10 - Clear Customer Information

No.	Type	Description
1	**Name**	Clear Customer Information
2	**ID**	N10
	Functional block	N. Diagnostics
3	**Objective(s)**	To enable the CSMS to clear (and retrieve) raw customer information from a Charging Station.
4	**Description**	The CSMS sends a message to the Charging Station to clear (and retrieve) raw customer information, for example to be compliant with local privacy laws. The Charging Station notifies the CSMS by sending one or more reports.
	Actors	Charging Station, CSMS

No.	Type	Description
	Scenario description	**1.** The CSMS sends CustomerInformationRequest with the clear flag set to *true* to the Charging Station with a reference to a customer (idToken, customerCertificate or customerIdentifier). **2.** The Charging Station responds with CustomerInformationResponse, indicating whether it will send it or not. **3.** If the report flag is set to *true*, the Charging Station sends one or more NotifyCustomerInformationRequest messages to the CSMS. **4.** The CSMS responds with one or more NotifyCustomerInformationResponse messages to the Charging Station.
5	**Prerequisite(s)**	n/a
6	**Postcondition(s)**	The CSMS has *Successfully* received a CustomerInformationResponse message with status *Accepted*, the Charging Station has removed the customer information as requested and (if report flag was set to *true*) the CSMS has *Successfully* received the removed data.

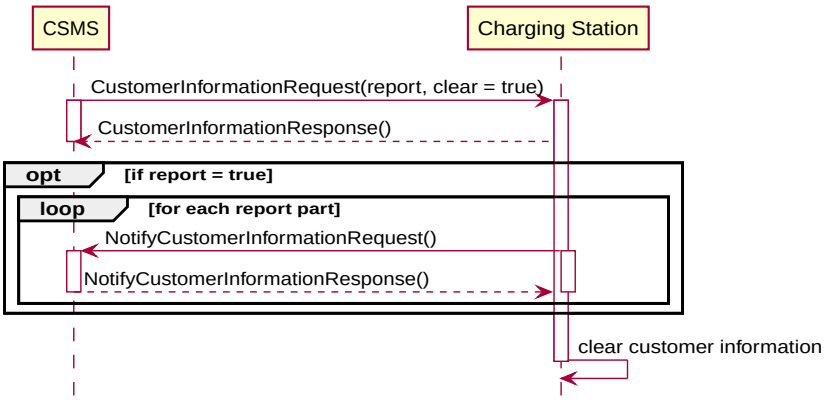

Figure 139. Sequence Diagram: Clear Customer Information

7	**Error handling**	n/a
8	**Remark(s)**	n/a

N10 - Clear Customer Information - Requirements

Table 233. N10 - Requirements

ID	Precondition	Requirement definition	Note
N10.FR.01	When the Charging Station receives a CustomerInformationRequest AND it is in a state where it can process this request.	the Charging Station SHALL respond with a CustomerInformationResponse message with status *Accepted* .	
N10.FR.02	When the Customer referred to by the customer identifier is present in the Local Authorization List of a Charging Station	The CSMS SHALL update the Local Authorization List using the SendLocalListRequest (see D01 - Send Local Authorization List).	To prevent problems with Local Authorization List versions.
N10.FR.03	N10.FR.01 AND receiving a CustomerInformationRequest with the clear flag set to *true* and the report flag set to *true* AND the Charging Station has information stored about the customer referred to by the customer identifier.	The Charging Station SHALL remove all customer related data for the Customer referred to by the customer identifier from the Charging Station, except from the LocalList AND the Charging Station SHALL send the cleared information via one or more NotifyCustomerInformationRequest messages to the CSMS.	To prevent problems with LocalList versions only the CSMS can change the contents of the LocalList.
N10.FR.04	N10.FR.01 AND receiving a CustomerInformationRequest with the clear flag set to *true* and the report flag set to *true* AND the Charging Station has no information stored about the customer referred to by the customer identifier.	The Charging Station SHALL send one NotifyCustomerInformationRequest message to the CSMS indicating that no data was found.	

ID	Precondition	Requirement definition	Note
N10.FR.05	When the Charging Station receives a CustomerInformationRequest and is in a state where it cannot process this request.	The Charging Station SHALL respond with a CustomerInformationResponse with status *Rejected*	
N10.FR.06	N10.FR.01 AND receiving a CustomerInformationRequest with the clear flag set to *true*, the report flag set to *false*	The Charging Station SHALL remove all customer related data for the Customer referred to by the customer identifier from the Charging Station, except from the LocalList AND the Charging Station SHALL send one NotifyCustomerInformationRequest message to the CSMS indicating that the data was cleared.	To prevent problems with LocalList versions only the CSMS can change the contents of the LocalList.
N10.FR.07	When receiving a CustomerInformationRequest with both the report flag as well as the clear flag are set to *false*	It is RECOMMENDED to respond with a CustomerInformationResponse message with status *Rejected* .	
N10.FR.08		The CSMS SHALL include a reference to a customer by including either an idToken, customerCertificate or customerIdentifier in the CustomerInformationRequest.	
N10.FR.09	When clearing user information according to the *customerCertificate*	The CSMS SHALL use the *hashAlgorithm*, which was used to install the certificate.	When a new firmware is installed it is RECOMMENDED that the CSMS requests the certificate first using GetInstalledCertificateIds Request to be sure of the used *hashAlgorithm*.