



OCPP 2.0
Part 2 - Appendices

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Appendix 1. Security Events

The table below provides a list of security events. Security events that are critical should be pushed to the CSMS.

Security Event	Description	Critical
FirmwareUpdated	The Charging Station firmware is updated	Yes
FailedToAuthenticateAtCsms	The authentication credentials provided by the Charging Station were rejected by the CSMS	No
CsmsFailedToAuthenticate	The authentication credentials provided by the CSMS were rejected by the Charging Station	No
SettingSystemTime	The system time on the Charging Station was changed	Yes
StartupOfTheDevice	The Charging Station has booted	Yes
ResetOrReboot	The Charging Station was rebooted or reset	Yes
SecurityLogWasCleared	The security log was cleared	Yes
ReconfigurationOfSecurityParameters	Security parameters, such as keys or the security profile used, were changed	No
MemoryExhaustion	The Flash or RAM memory of the Charging Station is getting full	Yes
InvalidMessages	The Charging Station has received messages that are not valid OCPP messages, if signed messages, signage invalid/incorrect	No
AttemptedReplayAttacks	The Charging Station has received a replayed message (other than the CSMS trying to resend a message because it there was for example a network problem)	No
TamperDetectionActivated	The physical tamper detection sensor was triggered	Yes
InvalidFirmwareSignature	The firmware signature is not valid	No
InvalidFirmwareSigningCertificate	The certificate used to verify the firmware signature is not valid	No
InvalidCsmsCertificate	The certificate that the CSMS uses was not valid or could not be verified	No
InvalidChargingStationCertificate	The certificate sent to the Charging Station using the SignCertificateResponse message is not a valid certificate	No
InvalidTLSVersion	The TLS version used by the CSMS is lower than 1.2 and is not allowed by the security specification	No
InvalidTLSCipherSuite	The CSMS did only allow connections using TLS cipher suites that are not allowed by the security specification	No

Appendix 2. Standardized Units of Measure

The standardized values for Unit of Measure. Default value of "unit" is always "Wh".

Value	Description
A	Amperes (current)
ASU	Arbitrary Strength Unit (Signal Strength)
B	Bytes
Celsius	Degrees (temperature)
dB	Decibel (for example Signal Strength)
dBm	Power relative to 1mW ($10\log(P/1mW)$)
Deg	Degrees (angle/rotation)
Fahrenheit	Degrees (temperature)
Hz	Hertz (frequency)
K	Degrees Kelvin (temperature)
lx	Lux (Light Intensity)
m	Meter (length)
ms²	m/s ² (Acceleration)
N	Newtons (Force)
Ohm	Ohm (Impedance)
kPa	kiloPascal (Pressure)
Percent	Percentage
RH	Relative Humidity%
RPM	Revolutions per Minute
s	Seconds (Time)
V	Voltage (DC or r.m.s. AC)
VA	Volt-Ampere (apparent power)
kVA	kiloVolt-Ampere (apparent power)
VAh	Volt-Ampere-hours (apparent energy)
kVAh	kiloVolt-Ampere-hours (apparent energy)
var	vars (reactive power)
kvar	kilovars (reactive power)
varh	var-hours (reactive energy)
kvarh	kilovar-hours (reactive energy)
W	Watts (power)
kW	kilowatts (power)
Wh	Watt-hours (energy). Default
kWh	kilowatt-hours (energy)

Appendix 3. Standardized Components

3.1. Controller Components

This is the list of Standardized Controller Components for OCPP 2.0.

Please note: for interoperability reasons, it is NOT allowed to implement additional *Controller* components/variables.

3.1.1. AlignedDataCtrlr

Description	
Logical Component responsible for configuration relating to the reporting of clock-aligned meter data.	
Variables	Description
Enabled	If this variable reports a value of true, Aligned Data is enabled.
Available	If this variable reports a value of true, Aligned Data is supported.
Interval	Size (in seconds) of the clock-aligned data interval, intended to be transmitted in the MeterValuesRequest message.
Measurands	Clock-aligned measurand(s) to be included in MeterValuesRequest, every AlignedDataInterval seconds.
SendDuringIdle	If set to true, the Charging Station SHALL not send clock aligned meter values when a transaction is ongoing.
SignReadings	If set to true, the Charging Station SHALL include signed meter values in the TransactionEventRequest to the CSMS.
TxEndedInterval	Clock-aligned periodic measurand(s) to be included in the meterValues element of TransactionEventRequest (eventType = Ended) for every TxEndedAlignedDataInterval of the transaction.
TxEndedMeasurands	Size (in seconds) of the clock-aligned data interval, intended to be transmitted in the TransactionEventRequest (eventType = Ended) message.

3.1.2. AuthCtrlr

Description	
Logical Component responsible for configuration relating to the use of authorization for Charging Station use.	
Variables	Description
Enabled	If this variable reports a value of true, Authorization is enabled.
AdditionalInfoMaxItems	Maximum number of AdditionalInfo items that can be sent in one message.
OfflineTxForUnknownIdEnabled	If this key exists, the Charging Station supports Unknown Offline Authorization.
AuthorizeRemoteStart	Whether a remote request to start a transaction in the form of RequestStartTransactionRequest message should be authorized beforehand like a local action to start a transaction.
LocalAuthorizeOffline	Whether the Charging Station, when Offline, will start a transaction for locally-authorized identifiers.
LocalPreAuthorize	Whether the Charging Station, when online, will start a transaction for locally-authorized identifiers without waiting for or requesting an AuthorizeResponse from the CSMS.
MasterPassGroupId	IdTokens that have this id as groupId belong to the Master Pass Group.

3.1.3. AuthCacheCtrlr

Description	
Logical Component responsible for configuration relating to the use of a local cache for authorization for Charging Station use.	
Variables	Description
Enabled	If this variable exists, the Charging Station supports an Authorization Cache.
Available	If this variable reports a value of true, Authorization Cache is supported.
LifeTime	Indicates how long it takes until a token expires in the authorization cache since it is last used.

3.1.4. ClockCtrlr

Description	
Provides a means to configure management of time tracking by Charging Station.	
Variables	Description
DateTime	Contains the current date and time.
NtpServerAddress	This contains the address of the NTP server.
NtpSource	When an NTP client is implemented, this variable can be used to configure the client: Use the NTP server provided via DHCP, or use the manually configured NTP server.
TimeOffset	Configured local time offset in the format: "+01:00", "-02:00" etc.
NextTimeOffsetTransitionDateTime	Date time of the next time offset transition.
TimeSource	Via this variable, the Charging Station provides the CSMS with the option to configure a clock source, if more than 1 are implemented.
TimeZone	Configured current local time zone in the format: "Europe/Oslo", "Asia/Singapore" etc.

3.1.5. DeviceDataCtrlr

Description	
Logical Component responsible for configuration relating to the exchange and storage of Charging Station Device Model data.	
Variables	Description
BytesPerMessage	Message Size (in bytes) - maxLimit used to report constraint on message size. Which message is specified in the instance.
ItemsPerMessage	Maximum number of entries that can be sent in one message. Which entries in which message is specified in the instance.
ValueSize	Can be used to limit the following fields: SetVariableData.attributeValue, GetVariableResult.attributeValue, VariableAttribute.value, VariableCharacteristics.valueList and EventData.actualValue.

3.1.6. DisplayMessageCtrlr

Description	
Logical Component responsible for configuration relating to the display of messages to Charging Station users.	
Variables	Description
Enabled	Whether Display Message is enabled.
Available	Whether Display Message is supported.
DisplayMessages	Amount of different messages that are currently configured in this Charging Station, via SetDisplayMessageRequest.
SupportedFormats	List of message formats supported by this Charging Station. Possible values: MessageFormat.
SupportedPriorities	List of the priorities supported by this Charging Station. Possible values: MessagePriority.

3.1.7. OCPPCommCtrlr

Description	
Logical Component responsible for configuration relating to information exchange between Charging Station and CSMS.	
Variables	Description
ActiveNetworkProfile	Indicates the configuration profile the station uses at that moment to connect to the network.
FileTransferProtocols	List of supported file transfer protocols.
HeartbeatInterval	Interval of inactivity (no OCPP exchanges) with CSMS after which the Charging Station should send HeartbeatRequest.
NetworkConfigurationPriority	A comma separated ordered list of the priority of the possible Network Connection Profiles.
NetworkProfileConnectionAttempts	Specifies the number of connection attempts the Charging Station executes before switching to a different profile.
OfflineThreshold	When the offline period of a Charging Station exceeds the OfflineThreshold it is recommended to send a StatusNotificationRequest for all its Connectors.
QueueAllMessages	When this variable is set to true, the Charging Station will queue all message until they are delivered to the CSMS.
MessageAttempts	How often the Charging Station should try to submit a TransactionEventRequest message when the CSMS fails to process it.

Description	
MessageAttemptInterval	How long the Charging Station should wait before resubmitting a TransactionEventRequest message that the CSMS failed to process.
UnlockOnEVSideDisconnect	When set to true, the Charging Station will unlock the cable on Charging Station side when the cable is unplugged at the EV.
WebSocketPingInterval	Number of seconds between pings.
RetryBackOffRepeatTimes	When the Charging Station is reconnecting, after a connection loss, it will use this variable for the amount of times it will double the previous back-off time.
RetryBackOffRandomRange	When the Charging Station is reconnecting, after a connection loss, it will use this variable as the maximum value for the random part of the back-off time.
RetryBackOffWaitMinimum	When the Charging Station is reconnecting, after a connection loss, it will use this variable as the minimum back-off time, the first time it tries to reconnect.

3.1.8. LocalAuthListCtrlr

Description	
Logical Component responsible for configuration relating to the use of Local Authorization Lists for Charging Station use.	
Variables	Description
Enabled	Whether Local Authorization List is enabled.
Entries	Amount of IdTokens currently in the Local Authorization List. The maxLimit of this variable SHALL be provided to report the maximum number of IdTokens that can be stored in the Local Authorization List.
Available	Whether Local Authorization List is supported.
ItemsPerMessage	Maximum number of identifications that can be sent in a single SendLocalListRequest.
BytesPerMessage	Message Size (in bytes) - puts a constraint on SendLocalListRequest message size.
Storage	Indicates the number of bytes currently used by the Local Authorization List. MaxLimit indicates the maximum number of bytes that can be used by the Local Authorization List.

3.1.9. MonitoringCtrlr

Description	
Logical Component responsible for configuration relating to the exchange of monitoring event data.	
Variables	Description
Enabled	Whether Monitoring is enabled.
Available	Whether Monitoring is supported.
ItemsPerMessage	Maximum number of items.
BytesPerMessage	Message Size (in bytes) - puts constraint on message size.
OfflineQueuingSeverity	When set and the Charging Station is offline, the Charging Station shall queue any notifyEventRequest messages triggered by a monitor with a severity number equal to or lower than the severity configured here. Value ranging from 0 (Emergency) to 9 (Debug).

3.1.10. ReservationCtrlr

Description	
Logical Component responsible for configuration relating to reservations.	
Variables	Description
Enabled	Whether Reservation is enabled.
Available	Whether Reservation is supported.
NonEvseSpecific	If this configuration variable is present and set to true: Charging Station supports Reservation on evse 0.

3.1.11. SampledDataCtrlr

Description	
Logical Component responsible for configuration relating to the reporting of sampled meter data.	
Variables	Description
Enabled	If this variable reports a value of true, Sampled Data is enabled.
Available	If this variable reports a value of true, Sampled Data is supported.

Description	
SignReading	If set to true, the Charging Station includes signed meter values in the MeterValuesRequest to the CSMS.
TxEndedMeasurands	Sampled measurands to be included in the meterValues element of TransactionEventRequest (eventType = Ended), every TxEndedSampleInterval seconds from the start of the transaction.
TxEndedInterval	Interval between sampling of metering (or other) data, intended to be transmitted in the TransactionEventRequest (eventType = Ended) message.
TxStartedMeasurands	Sampled measurand(s) to be taken at the start of any transaction to be included in the meterValues field of the first TransactionEventRequest message send at the start of a transaction (eventType = Started).
TxUpdatedMeasurands	Sampled measurands to be included in the meterValues element of every TransactionEventRequest (eventType = Updated), every SampledDataTxUpdatedInterval seconds from the start of the transaction.
TxUpdatedInterval	Interval between sampling of metering (or other) data, intended to be transmitted via TransactionEventRequest (eventType = Updated) messages.

3.1.12. SecurityCtrlr

Description	
Logical Component responsible for configuration relating to security of communications between Charging Station and CSMS.	
Variables	Description
BasicAuthPassword	Hexadecimal representation of the password that the Charging Station uses to authenticate itself if HTTP Basic authentication is used (20 bytes maximum, represented as a string of up to 40 hexadecimal digits). If certificates are used, this option does not have to be present.
Identity	The Charging Station identity. identity is an identifying string, so it SHALL only contain characters that are allowed for identifierString. Maximum length was chosen to ensure compatibility with EVSE ID from [EMI3] "Part 2: business objects".
OrganizationName	Organization name that is to be used for checking a security certificate.

3.1.13. SmartChargingCtrlr

Description	
Logical Component responsible for configuration relating to smart charging.	
Variables	Description
Enabled	Whether Smart Charging is enabled.
Available	Whether Smart Charging is supported.
ACPhaseSwitchingSupported	If defined and true, this EVSE supports the selection of which phase to use for 1 phase AC charging.
ProfileStackLevel	Max StackLevel of a ChargingProfile. The number defined also indicates the max allowed number of installed charging schedules per Charging Profile Purposes.
RateUnit	A list of supported quantities for use in a ChargingSchedule. Allowed values: 'A' and 'W'.
PeriodsPerSchedule	Maximum number of periods that may be defined per ChargingSchedule.
ExternalControlSignalsEnabled	Indicates whether a Charging Station should respond to external control signals that influence charging.
NotifyChargingLimitWithSchedules	Indicates if the Charging Station should include the externally set charging limit/schedule in the message when it sends a NotifyChargingLimitRequest message. This might increase the data usage significantly, especially when an external system sends new profiles/limits with a short interval. Default is false when omitted.
Phases3to1	If defined and true, this Charging Station supports switching from 3 to 1 phase during a transaction.
Entries	Amount of Charging profiles currently installed on the Charging Station. MaxLimit used to limit number of Charging profiles installed at any time.
LimitChangeSignificance	If at the Charging Station side a change in the limit in a ChargingProfile is lower than this percentage, the Charging Station MAY skip sending a NotifyChargingLimitRequest or a TransactionEventRequest message to the CSMS. It is RECOMMENDED to set this key to a low value. See Smart Charging signals to a Charging Station from multiple actors.

3.1.14. TariffCostCtrlr

Description	
Logical Component responsible for configuration relating to tariff and cost display.	
Variables	Description

Description	
Enabled	Whether Tariff/cost is enabled.
Available	Whether Tariff/cost is supported.
TariffFallbackMessage	Message (and/or tariff information) to be shown to an EV Driver when there is no driver specific tariff information available.
TotalCostFallbackMessage	Message to be shown to an EV Driver when the Charging Station cannot retrieve the cost for a transaction at the end of the transaction.
Currency	Currency used by this Charging Station in a ISO 4217 formatted currency code.

3.1.15. TxCtrlr

Description	
Logical Component responsible for configuration relating to transaction characteristics and behaviour.	
Variables	Description
ChargingBeforeAcceptedEnabled	With this configuration variable the Charging Station can be configured to allow charging before having received a BootNotificationResponse with RegistrationStatus: Accepted.
EVConnectionTimeOut	Interval from between "starting" of a transaction until incipient transaction is automatically canceled, due to failure of EV driver to (correctly) insert the charging cable connector(s) into the appropriate socket(s). The Charging Station SHALL go back to the original state, probably: 'Available'. "Starting" might be the swiping of the RFID, pressing a start button, a RequestStartTransactionRequest being received etc.
StopTxOnEVSideDisconnect	When set to true, the Charging Station SHALL administratively stop the transaction when the cable is unplugged from the EV.
TxBeforeAcceptedEnabled	If this Charging Station is allowed to start transaction before being accepted by a CSMS. See: Transactions before being accepted by a CSMS.
TxStartPoint	Defines when the Charging Station starts a new transaction: first transactioneventRequest: eventType = Started. When any event in the given list occurs, the Charging Station SHALL start a transaction. The Charging Station SHALL only send the Started event once for every transaction. It is advised to put all events that should be part of a transaction in the list, in case the start event never occurs. Because the possible events don't always have to come in the same order it is possible to provide a list of events. Which ever comes first will then cause a transaction to be started. For example: EVConnected, Authorized would mean that a transaction is started when an EV is detected (Cable is connected), or when an EV Driver swipes his RFID card en the CSMS successfully authorizes the ID for charging.
TxStopPoint	Defines when the Charging Station ends a transaction: last transactioneventRequest: eventType = Ended. When any event in the given list is no longer valid, the Charging Station SHALL end the transaction. The Charging Station SHALL only send the Ended event once for every transaction.
MaxEnergyOnInvalidId	Maximum amount of energy in Wh delivered when an identifier is deauthorized by the CSMS after start of a transaction.
StopTxOnInvalidId	whether the Charging Station will stop an ongoing transaction when it receives a non-Accepted authorization status in TransactionEventResponse for this transaction.

3.2. Physical Components

This is a non-exhaustive list of Standardized Physical Components that SHALL be used when mapping a real Charging Station to the Device Model (for monitoring purposes).

When the physical component that is to be mapped, matches the *description* of one of the Standardized Components in this section, for interoperability reasons, the Standardized Component from this section SHALL be used, instead of adding a new (proprietary) component.

The list of typically used variables that is given for each Component is also non-exhaustive and all variables are optional. See also Part 1, paragraph 4.5. If a description of a variable is empty, please refer to the description in [Standardized Variables](#).

3.2.1. AccessBarrier

Description	
Allows physical access of vehicles to a charging site to be controlled.	
Typically used variables	Description
Enabled	
Active	Open
Problem	

3.2.2. AcDcConverter

Description	
Provides a variable DC current source to force energy directly into an EV battery stack, under tight control of the EV's battery management system.	
Typically used variables	Description
Enabled	(not commanded Out of Service)
Problem	some problem/fault exists
Tripped	A problem requiring intervention has occurred
Overload	Excessive current/power consumption
DCVoltage	measured DC voltage
DCCurrent	measured DC current
Power	measured power
Temperature	temperature of converter
FanSpeed	Speed of cooling fan(s)

3.2.3. AcPhaseSelector

Description	
Allows a specific AC phase to be selected (typically at EVSE tier) for single phase vehicle charging in order to lower overall (e.g. site) phase imbalance.	
Typically used variables	Description
Enabled	
Active	Changing
Problem	
PhaseRotation	

3.2.4. Actuator

Description	
A general purpose electro-mechanical output system, with optional completion tracking sensing. Each output should use a Variable instance key indicating the nature of the output.	
Typically used variables	Description
Enabled	
Active	Non-Default
Problem	
State	

3.2.5. AirCoolingSystem

Description	
Fans (or equivalent devices) used to provide cooling.	
Typically used variables	Description
Enabled	Cooling system enabled to run
Active	Cooling
Problem	fault: e.g. fan stalled/slow
FanSpeed	Speed of cooling fan(s)

3.2.6. AreaVentilation

Description	
Fans (or equivalent devices) used to ensure that EVs that require ventilation during charging	
Typically used variables	Description
Enabled	Area ventilation enabled
Active	Ventilating
Problem	fault: e.g. fan stalled/slow

Description	
FanSpeed	Speed of cooling fan(s)

3.2.7. BayOccupancySensor

Description	
Sensor (optical, ground loop, ultrasonic, etc.) to detect whether the associated parking/charging bay is physically vacant, or is occupied by a vehicle or other obstruction	
Typically used variables	Description
Enabled	Sensor is sensing for occupancy
Active	Occupied
Percent	percentage obstruction (for analogue sensors).

3.2.8. BeaconLighting

Description	
Beacon Lighting to help EV drivers to locate nearby charging places, and/or to determine charging availability state, usually by color variation.	
Typically used variables	Description
Enabled	Beacon Lighting operational
Enabled(Set)=0	Disable beacon lighting
Active	On
Problem	Beacon lighting fault
Percent	Lighting Level (% of maximum)
Percent(Set)=x%	Lighting Level (% of maximum)
Power	Lighting Wattage
Color	Displayed color/intensity

3.2.9. CableBreakawaySensor

Description	
A sensor that detects when a charging cable (captive or removable) has been forcibly pulled from the Charging Station.	
Typically used variables	Description
Enabled	Breakaway sensor operational
Active	Tripped
Tripped	Breakaway detected: manual check/fix required

3.2.10. CaseAccessSensor

Description	
Reports when an access door/panel is open	
Typically used variables	Description
Enabled	Access sensor is enabled to detect/report opening/closing of access door/panel
Enabled(Set)=0	Disable reporting of access
Active	Open
Tripped	An access door/panel that needs manual reset action has been activated
Problem	A fault exists in the Sensor mechanism itself

3.2.11. CHAdeMOController

Description	
A CHAdeMO Controller component communicates with an EV using the wired CANbus protocol to exchange information and control charging using the CHAdeMO protocol	
Typically used variables	Description
Enabled	CHAdeMO controller enabled
Active	Connected

Description	
Complete	Protocol session ended normally
Tripped	CHAdEMO protocol terminated abnormally
Problem	CHAdEMO controller fault
SelftestActive(Set)	Start self-test
SelftestActive	Self-test running

3.2.12. ChargingStation

Description	
The entire Charging Station as a logical entity	
Typically used variables	Description
Enabled	Available for use (not commanded Out of Service)
Problem	Some problem/fault exists
Identity	Charging Station identity
Tripped	A problem requiring local/manual intervention has occurred.
Overload	Excessive current/power consumption
SupplyPhases	Number of AC supply phases connected
SupplyPhases(MaxLimit)	Number of AC supply phases supported
PhaseRotation	AC wiring phase rotation
ACVoltage	Measured incoming AC voltage [per phase]
ACVoltage(MaxLimit)	Designed maximum operating AC voltage
ACCurrent	Measured total AC current [per phase]
Power	Measured/calculated total power being consumed, including standby/ancillary loads
Power(MaxLimit)	Designed total operating load power, including standby/ancillary loads
VoltageImbalance	voltage imbalance in three phase supply
CurrentImbalance	current imbalance in three phase supply
Manufacturer	Charging Station manufacturer name
Model	Charging Station manufacturer model
ECVariant	Engineering Change Variant
SerialNumber	Charging Station serial number
OperatingTimes	recurring operating times
ChargeProtocol	Charging Control Protocol applicable to the Charging Station
AvailabilityState	Indicates if the Charging Station is available or not (replaces the Charging Station Status values reported by the StatusNotification)

3.2.13. ChargingStatusIndicator

Description	
The Charging Status Indicator, provides visible feedback to the user about the connection and charging status of an EVSE/Connector. This is commonly in the form of multi-colored lighting.	
Typically used variables	Description
Active	Lighted
Color	Displayed color

3.2.14. Connector

Description	
A means to connect an EV to a Charging Station with either a socket, an attached cable & inline connector, or any wireless power transfer device.	
Typically used variables	Description
Enabled	Connector available for use (not commanded Out of Service)
Problem	problem/fault exists (e.g. over-temperature)
Tripped	A problem requiring intervention has occurred.
ConnectorType	Type of Connector (e.g. sType2)
SupplyPhases	AC phases connected
SupplyPhases(MaxLimit)	AC phases Max

Description	
PhaseRotation	AC wiring phase rotation
ChargeProtocol	Charging Control Protocol applicable to the Connector

3.2.15. ConnectorHolsterRelease

Description	
A mechanism present in a connector holster to prevent the connector from being removed inappropriately: typically unlocks connector after authorization.	
Typically used variables	Description
Enabled	
Active	Unlocked for removal/return
Problem	
State	

3.2.16. ConnectorHolsterSensor

Description	
A mechanism to report when a tethered cable connector has been removed from its normal stowage position. May be used for detection of connectors left un-holstered, and possible penalty billing.	
Typically used variables	Description
Enabled	
Active	Un-Holstered
Problem	

3.2.17. ConnectorPlugRetentionLock

Description	
Locking mechanism to retain an inserted plug, both to prevent on-load disconnection, and to prevent theft of charging cables	
Typically used variables	Description
Enabled	Retention mechanism enabled
Active	Locked
Problem	Locking Failed
Tripped	Stall protection fuse blown, etc.
Tries	(Re)tries taken on last attempt
Tries(SetLimit)	Configured auto retry count
Tries(MaxLimit)	Maximum auto retry count

3.2.18. ConnectorProtectionRelease

Description	
External protective mechanism (e.g. an external shutter or a connector holster lock mechanism) to prevent contact with conductors that may become "live" under other failure modes	
Typically used variables	Description
Enabled	Protection in effect (locked except when in use)
Active	Unlocked
Problem	Lock/Unlock mechanism fault
Tripped	protective mechanism triggered (fuse)

3.2.19. Controller

Description	
An embedded logic controller	
Typically used variables	Description
Active	Running
Problem	Controller fault

Description	
Interval[Heartbeat]	Heartbeat interval
Manufacturer	Controller manufacturer name
Model	Controller model number
ECVariant	Engineering Change variant
SerialNumber	Controller hardware serial number
VersionNumber	Hardware version number
VersionDate	Hardware version date
MaxMsgElements	Array of implementation-defined limits to the number of elements of specific type that the Charging Station can accept in one message.
SelftestActive(Set)	Start self-test
SelftestActive	Self-test running

3.2.20. ControlMetering

Description	
Energy, Power, Electricity meter, used to measure energy, current, voltages etc.	
Typically used variables	Description
Power	Measured power
ACCurrent	Measured AC current [per phase]
DCCurrent	Measured DC current
DCVoltage	Measured DC voltage

3.2.21. CPPWMController

Description	
Control Pilot PWM Controller: provides and senses the IEC 61851-1 / SAE J1772 low voltage DC and PWM signalling between an EVSE and EV over a control pilot line.	
Typically used variables	Description
Enabled	
Active	Connected
Problem	CP PWM controller fault
DCVoltage	Control Pilot wire DC Voltage (0-12V)
State	IEC 61851-1 states ("A" to "E")
Percentage	1kHz Duty Cycle
SelftestActive(Set)	Start self-test
SelftestActive	Self-test running

3.2.22. DataLink

Description	
Provides a communications link from a Charging Station to a CSMS. It may use fixed infrastructure, mobile telephony data services, WiFi, or other connectivity channels.	
Typically used variables	Description
Enabled	Data link enabled
Active	Connected
Fallback	Using Backup SIM/Network Preference
Complete	Link connection terminated
Problem	Communications module or link connection fault
IMSI	International Mobile Subscriber Identity number of mobile data SIM card
ICCID	Integrated Circuit Card Identifier of mobile data SIM card.
NetworkAddress	Current network address
SignalStrength	Data signal strength/quality

3.2.23. Display

Description	
Provides information and feedback to the user.	
Typically used variables	Description
Enabled	Display configured to show information
Problem	Display fault
Color	Display color (monochrome/backlighting)
Count[HeightInChars]	Display height (characters)
Count[WidthInChars]	Display width (characters)
DataText[Visible]	Current Display Contents
State	Alphanumeric code indicating current message purpose

3.2.24. DistributionPanel

Description	
Defines the Distribution Panel, with it's fuses and connections to both Charging Stations and other Distribution Panel's.	
Common Variables	Description
InstanceName	Name of the distribution box
Fuse	Fuse (index n) is the fuse for phase Ln in Ampere.
ChargingStation	The Identity of Charging Station (index n) which is connected to this DistributionPanel. Note: this is an indexed list of Charging Station Identities, not to be confused by the Charging Station component.
ChargingStation	List of Charging Stations Identities connected to this LocalController. (not to be confused with the ChargingStation Component)
DistributionPanel	List of Distribution Panels InstanceNames connected to this LocalController. (not to be confused with the DistributionPanel Component) See the LocalController component for an example.

3.2.25. ElectricalFeed

Description	
Represents an incoming electrical connection to a Charging Station, that may be a grid/distribution network connection, of a connection to local power generation and/or storage. Each electrical feed can record the electrical and other characteristics of that feed, including power rating, fusing, upstream metering, etc. When a Charging Station has more than one electrical feed, it must represent which feed supplies each EVSE, and which feed supplies the house load of the Charging Station itself. Simple Charging Stations with only a single electrical feed may omit all electrical feed information, in which case it is inferred that all power is supplied from a single feed, and what would otherwise be ElectricalFeed data (Variables) may be reported as being associated with the ChargingStation component.	
Typically used variables	Description
Enabled	
Active	Connected
Problem	
PowerType	
Power	
Energy	
DCVoltage	
SupplyPhases	
PhaseRotation	
ACVoltage	

3.2.26. ELVSupply

Description	
Represents the low voltage power supply (typically 12V DC and often other ELV voltages) that provides operating power for controllers, relays, and other electrical components.	
Typically used variables	Description
EnergyImportRegister	Standby/house energy meter register reading
Power	instantaneous standby power consumption

Description	
Power(MaxLimit)	Design maximum standby power consumption
Fallback	Running on backup energy;
Fallback(MaxLimit): =1	has backup
StateOfCharge	backup battery SOC
Time	(estimated) operating time on backup energy

3.2.27. EmergencyStopSensor

Description	
An "Emergency Stop" button that should be pressed by the user or other nearby persons if serious faulty behavior is observed (e.g. smoke/flames from EV or Charging Station).	
Typically used variables	Description
Enabled	Emergency Stop action armed
Active	Pressed/Latched
Tripped	Needs manual reset

3.2.28. EnvironmentalLighting

Description	
Provides reporting/control of general illumination lighting in use at Charging Station.	
Typically used variables	Description
Enabled	Environmental Lighting operational
Enabled(Set)=0	Disable Environmental lighting
Active	On
Problem	Environmental lighting fault
Percent	Lighting Level (% of maximum)
Percent(Set)=x%	Lighting Level (% of maximum)
Power	Lighting Wattage
Color	Displayed color/intensity

3.2.29. EVRetentionLock

Description	
A locking mechanism on the EV side as a safety measure to prevent it being disconnected while high currents are flowing.	
Typically used variables	Description
Enabled	Retention locking detection in effect
Active	Locked to EV
Complete	Has unlocked
Problem	Lock Problem (e.g. failed to lock/unlock)

3.2.30. EVSE

Description	
The entire chain of components responsible for transporting energy from the incoming supply to the electric vehicle (or vice versa)	
Typically used variables	Description
Enabled	Ready for use (not commanded Out of Service)
Problem	some problem/fault exists
Tripped	A problem requiring intervention has occurred
Overload	Excessive current/power consumption
SupplyPhases	AC phases connected
PhaseRotation	AC wiring phase rotation
AC Voltage	Measured total AC voltage [per phase]
ACCurrent	Measured total AC current [per phase]
DC Voltage	Measured total DC voltage [per phase]
DCCurrent	Measured total DC current [per phase]

Description	
Power	Measured Power
VoltageImbalance	voltage imbalance in three phase supply
CurrentImbalance	current imbalance in three phase supply
ChargeProtocol	Charging Control Protocol applicable to the EVSE
ChargingTime	Total time duration that EV is taking energy from an EVSE. Short pauses in charging (e.g. battery pre-, post-conditioning) are included
PostChargingTime	Total time since EV has taken energy from EVSE
Count[ChargingProfiles]	Charging Profiles present
Count[ChargingProfiles](MaxLimit)	Maximum Charging Profiles supported
AvailabilityState	Indicates if the EVSE is available or not (replaces the EVSE Status values reported by the StatusNotification)

3.2.31. ExternalTemperatureSensor

Description	
Reports ambient air temperature	
Typically used variables	Description
Active	Temperature above MaxSet or MinSet
Problem	Temperature sensor fault
Temperature	Ambient temperature

3.2.32. FiscalMetering

Description	
Provides energy transfer readings that are the basis for billing.	
Typically used variables	Description
Problem	Metering Fault (e.g. read error)
EnergyImport	Energy transferred to EV during session
EnergyImportRegister	Cumulative import reading
EnergyExport	Energy transferred from EV during session
EnergyExportRegister	Cumulative export reading
Manufacturer[Meter]	Meter manufacturer name
Manufacturer[CT]	Current transformer manufacturer name
Model[Meter]	Meter model number
Model[CT]	CT model number
ECVariant	Meter engineering change variant
SerialNumber[Meter]	Meter serial number
SerialNumber[CT]	CT serial number(s)
Certificate	
OptionsSet [MeterValueAlignedData]	Set of measurands to read and report at clock-aligned time intervals while charging.
OptionsSet [TxnStoppedAlignedData]	Set of measurands to be read at clock-aligned time intervals while charging and reported in TransactionStopped

3.2.33. FloodSensor

Description	
A sensor reporting whether the Charging Station is experiencing water ingress/pooling.	
Typically used variables	Description
Enabled	Water presence/level sensing in effect
Active	Flooding
Tripped	Water level safety sensor tripped
Height	Absolute water height above reference (ground) level.
Percent	Height as percentage between reference minimum (0%) and maximum allowable (100%). Values below 0% and above 100% are possible.

3.2.34. GroundIsolationProtection

Description	
An Isolation Tester as part of their own self-test mechanisms, to confirm the isolation of floating circuitry when no Evs are connected	
Typically used variables	Description
Enabled	Electrical isolation testing enabled
Active	Leakage
Complete	Isolation test completed
Problem	Isolation fault
Impedance	Isolation resistance/impedance

3.2.35. Heater

Description	
Heater to ensure reliable operation in cold environments	
Typically used variables	Description
Enabled	Heater hardware operation enabled
Active	Heating
Problem	Heater fault
Tripped	Heater equipment permanent fault
Power	Instantaneous heater power level
Power(MaxLimit)	Maximum heater power
Power(MaxSet)	Configured heater power
Temperature(MinSet)	Cut-in temperature
Temperature(MaxSet)	Cut-out temperature

3.2.36. HumiditySensor

Description	
Reports relative air humidity	
Typically used variables	Description
Enabled	
Problem	Humidity sensor fault
Humidity	RH(%)

3.2.37. ISO15118Controller

Description	
Communicates with an EV to exchange information and control charging using the ISO 15118 protocol.	
Typically used variables	Description
Enabled	
Active	Connected
Tripped	ISO15118 communication session aborted
Complete	ISO15118 communication session ended
Problem	ISO15118 controller fault
SelftestActive(Set)	Start self-test
SelftestActive	Self-test running

3.2.38. LightSensor

Description	
Reports ambient light levels.	
Typically used variables	Description
Enabled	
Problem	Lighting sensor fault

Description	
Light	The ambient light level

3.2.39. LiquidCoolingSystem

Description	
A liquid based cooling system, typically used to cool the connector cables of very high power Charging Stations.	
Typically used variables	Description
Enabled	Cooling system enabled to run
Active	Liquid circulating
Problem	
Temperature	

3.2.40. LocalAvailabilitySensor

Description	
Accepts local signal inputs controlling whether new Charging Sessions can start and/or whether ongoing sessions should continue. Typically connected to a site/building power supply, to automatically report unavailability when closed.	
Typically used variables	Description
Enabled	Local Availability input sensing in operation
Active	Out of Service
Problem	Local Availability sensing circuit error

3.2.41. LocalController

Description	
The entire Local Controller as a logical entity	
Common Variables	Description
Enabled	Available for use (not commanded Out of Service)
Problem	Some problem/fault exists
Identity	Local Controller identity
Tripped	A problem requiring local/manual intervention has occurred.
Manufacturer	Local Controller manufacturer name
Model	Local Controller manufacturer model
ECVariant	Engineering Change Variant
SerialNumber	Local Controller serial number
ChargingStation	List of Charging Stations Identities connected to this LocalController. (not to be confused with the ChargingStation Component)

Description	
DistributionPanel	<p>List of Distribution Panels InstanceNames connected to this LocalController. (not to be confused with the DistributionPanel Component) This can be used to describes the electrical connections in the site controlled by the Local Controller.</p> <p>An example. The incoming fuses are all 120A. Each floor has a set of 80A fuses. On the first floor, there's also a group of Charging Stations that are behind a set of 32A fuses.</p> <pre> DistributionPanel.Fuse[1] = 120 DistributionPanel.Fuse[2] = 120 DistributionPanel.Fuse[3] = 120 DistributionPanel.DistributionPanel[0] = "Level-1" DistributionPanel.DistributionPanel[1] = "Level-2" DistributionPanel["Level-1"].Fuse[1] = 80 DistributionPanel["Level-1"].Fuse[2] = 80 DistributionPanel["Level-1"].Fuse[3] = 80 DistributionPanel["Level-1"].ChargingStation[0] = "NLCP013" DistributionPanel["Level-1"].ChargingStation[1] = "NLCP014" DistributionPanel["Level-1"].ChargingStation[2] = "NLCP015" DistributionPanel["Level-1"].DistributionPanel[0] = "Level-1a" DistributionPanel["Level-1a"].Fuse[1] = 32 DistributionPanel["Level-1a"].Fuse[2] = 32 DistributionPanel["Level-1a"].Fuse[3] = 32 DistributionPanel["Level-1a"].ChargingStation[0] = "NLCP130" DistributionPanel["Level-1a"].ChargingStation[1] = "NLCP136" DistributionPanel["Level-1a"].ChargingStation[2] = "NLCP132" DistributionPanel["Level-2"].Fuse[1] = 80 DistributionPanel["Level-2"].Fuse[2] = 80 DistributionPanel["Level-2"].Fuse[3] = 80 DistributionPanel["Level-2"].ChargingStation[0] = "NLCP023" DistributionPanel["Level-2"].ChargingStation[1] = "NLCP024" </pre>

3.2.42. LocalEnergyStorage

Description	
Energy storage	
Typically used variables	Description
Capacity	Maximum storage capacity
Identity	Local Energy Storage identity

3.2.43. OverCurrentProtection

Description	
Protects equipment by disconnecting the electrical supply when the current drawn (on any phase) exceeds the rated value to a substantial degree.	
Typically used variables	Description
Active	Tripped. Trip when over MaxSet/MaxLimit.
Operated	Breaker opened and auto-reclosed
ACCurrent	Measured total AC current [per phase]

3.2.44. OverCurrentProtectionRecloser

Description	
Recloser mechanism of an OverCurrentProtection to perform re-arm retries after a trip, or may be set for remotely controlled re-arming on command.	
Typically used variables	Description
Enabled	Auto reclosing enabled
Active	Reclosing
Active(Set)	Initiate manual reclose
Complete	Reclose cycle completed
Problem	Recloser Fault

Description	
Mode	Reclose Mode (None, Auto, Commanded)
Tries	(Re)tries taken on last attempt
Tries(SetLimit)	Configured auto retry count
Tries(MaxLimit)	Maximum auto retry count

3.2.45. PowerContactor

Description	
Switches on and off the power to the EV after all authorization and safety requirements have been met. May have secondary contacts to report closure state.	
Typically used variables	Description
Active	Closed
Tripped	Mirror contact protection tripped
Problem	Close/Open failed

3.2.46. RCD

Description	
A Residual Current Device (US: ground fault breaker) protects human life and/or downstream equipment by quickly detecting abnormal current flows (usually indicative in earth faults) in the Charging Station, cable, or EV during charging.	
Typically used variables	Description
Tripped	Breaker opened (manual reset required)
Operated	Breaker opened and auto-reclosed

3.2.47. RCDRecloser

Description	
A motorized recloser mechanism of an RCD that may be configured to perform re-arm retries after a trip, or may be set for remotely controlled re-arming on command.	
Typically used variables	Description
Enabled	Auto reclosing enabled
Active	Reclosing in progress
Active(Set)	Initiate manual reclose
Complete	Reclose cycle completed
Problem	Recloser Fault
Tries	(Re)tries taken on last attempt
Tries(SetLimit)	Configured auto (re)try count
Tries(MaxLimit)	Maximum auto (re)try count

3.2.48. RealTimeClock

Description	
Represents realtime clock hardware that can maintain accurate date & time information in a Charging Station, even in the case of simultaneous CSMS uncontactability and power outages or resets.	
Typically used variables	Description
Active	RTC running OK
DCVoltage	Battery voltage
Fallback	Battery failing
Fallback(MaxLimit)	RTC has backup-power. MaxLimit = 1
Problem	RTC fault

3.2.49. ShockSensor

Description	
Measures impact forces/accelerations experienced, indicative of possible damage.	

Description	
Typically used variables	Description
Enabled	Shock sensing enabled
Active	Shock
Force	detected force (vector)

3.2.50. SpacesCountSignage

Description	
Electronic signage allowing a charging controller for a large charging facility to advertise counts of available spaces to passing traffic.	
Typically used variables	Description
Enabled	Spaces count signage enabled
Active	Not Blank
Count	

3.2.51. Switch

Description	
A general purpose electromechanical input device, with optional remote defaulting/resetting of values. Each input should use a Variable instance key indicating the nature of the input.	
Typically used variables	Description
Enabled	
Active	Non-Default
State	

3.2.52. TemperatureSensor

Description	
Temperature sensor at a point inside the Charging Station; multiple sensing points for a single sensing controller. Multiple sensing points for a single sensing controller may be reported using distinct Variable instance keys.	
Typically used variables	Description
Active	High temperature (over MaxSet)
Problem	Internal temperature sensor fault
Temperature	Enclosure temperature

3.2.53. TiltSensor

Description	
Measures Tilt angle from normal reference position (normally 90 degree vertical).	
Typically used variables	Description
Enabled	Tilt sensing enabled
Active	Tilted
Angle	Measured tilt (vector) from vertical

3.2.54. TokenReader

Description	
An authorization token reader (e.g. RFID)	
Typically used variables	Description
Enabled	Token reader enabled
Enabled(Set)=0	Token reader disabled: allow charging without token authentication/authorization
Operated	token data read event
Problem	token reader fault
TokenInfo	A typed authorization Id structure

3.2.55. UpstreamProtectionTrigger

Description	
Circuitry designed to trigger the disconnection of power to the structure by an upstream protection device after a severe problem has been detected	
Typically used variables	Description
Enabled	Upstream protection enabled
Active(Set)	Force triggering of upstream protection
Tripped	Upstream protection triggered
Problem	Upstream protection fault

3.2.56. UIInput

Description	
A logical input mechanism (e.g. set of buttons) that is part of a UI whose use may be communicated to the CSMS (in near real time). May support momentary inputs ("Operated") or modal state ("Active"). Multiple input sources should use explicit Variable instance keys (where the input function is key name).	
Typically used variables	Description
Enabled	UI input enabled
Operated	
Active	

3.2.57. VehicleIdSensor

Description	
Reports an identifier associated with a vehicle occupying a charging bay. The identifier may be a vehicle registration number via ANPR hardware, a VIN, or other local identifier of the vehicle based on medium range/active RFID, or any other relevant technology and result.	
Typically used variables	Description
Enabled	VehicleIdSensor enabled
Active	Processing

Appendix 4. Standardized Variables

This is a non-exhaustive list of Standardized Variables that SHALL be used when the Charging Station and CSMS want to exchange information about a Variable. See also Part 1, paragraph 4.5.

Name	Data Type	Unit	Description
ACCurrent	decimal	A	RMS AC Current (in amperes). For 3-phase circuits, each phase (and optional neutral) is represented by a Variable instance equal to a value of the PhaseEnumType (e.g. L1,N). Unkeyed values reported for a Component declared to be multi-phase are assumed to be an average of all per-phase readings, and written values are common per-phase settings. Example(s): ChargingStation: Total AC current consumption (all EVSE's + ancillaries) EVSE: Total current consumed by EVSE: includes losses (AC→DC) and EVSE specific ancillaries (e.g. fans) ElectricalFeed: Inflow AC current on feed
ACPhaseSwitchingSupported	boolean		Indicates an on-load/in-transaction capability. If defined and true, this EVSE supports the selection of which phase to use for 1 phase AC charging.
Active	boolean		Component is in its non-resting / active state: e.g. On, Engaged, Locked. Some Components may have secondary functions that have corresponding Active Variables with an explicit Variable instance. Note: Monitoring of changes in the Active state of any Component can be specified by setting Delta monitoring on the boolean value with a delta values of 1. Setting/clearing an Active Variable activates/stops the associated functionality, where remotely controllable. Only components that are Available, and Enabled can be in the Active state.
ACVoltage	decimal	V	RMS AC Voltage (in volts). For 3-phase circuits, each phase (and optional neutral) is represented by a Variable instance equal to a value of the PhaseEnumType (e.g. L1,N). Unkeyed values reported for a Component declared to be multi-phase are assumed to be an average of all per-phase readings, and written values are common per-phase settings. Example(s): ElectricalFeed: Input Voltage
AllowChargingBeforeAccepted	boolean		Specifies whether the Charging Station is allowed to offer charging before having received a BootNotificationResponse with RegistrationStatus: Accepted."
OfflineTxForUnknownIdEnabled	boolean		If exists, the Charging Station supports Unknown Offline Authorization(See part 2 - C. Authorization - 1.5. Unknown Offline Authorization). If true, Unknown Offline Authorization is enabled.
Angle	decimal	Deg	Angle(s) relative to normal/design idle position. Multiple Variable instance values may be used to indicate angular position in multiple axes (e.g. Left-Right, Forward-Back).
AvailabilityState	OptionList		A value of ConnectorStatusEnumType (See part 2): replicates ConnectorStatus values reported in StatusNotification messages.
Available	boolean		The Component exists and is locally configured/wired for use, but might not be (remotely) Enabled.
AuthorizeRemoteStart	boolean		Specifies whether a remote request to start a transaction in the form of RequestStartTransactionRequest message should be authorized beforehand like a local action to start a transaction.
BasicAuthPassword	string		Hexadecimal representation of the password that the Charging Station uses to authenticate itself if HTTP Basic authentication is used (20 bytes maximum, represented as a string of up to 40 hexadecimal digits).
BytesPerMessage	integer		Message Size (in bytes) - maxLimit used to report constraint on message size.
Certificate	string		Digital Certificate (in Base64 encoding)
ChargeProtocol			The Charging Control Protocol applicable to a Connector. CHAdeMO: CHAdeMO protocol ISO15118: ISO15118 V2G protocol (wired or wireless) as used with CCS CPPWM: IEC61851-1 / SAE J1772 protocol (ELV DC & PWM signalling via Control Pilot wire) Uncontrolled: No charging power management applies (e.g. Schuko socket) Undetermined: Yet to be determined (e.g. before plugged in) Unknown: Not determinable NOTE: ChargeProtocol is distinct from, and orthogonal to, connectorCode.
ChargingTime	decimal	s	Time from earliest to latest substantive energy transfer

Appendix 4. Standardized Variables

Name	Data Type	Unit	Description
Color	string		Standard 24 bit hexadecimal RGB values. Reg Green Blue color intensity, expressed as standard 24 bit hexadecimal RGB values: 3 * 00-FF (0-255), in order RRGGBB). E.g. 000000: Black, FF0000: Red, 00FF00: Green, 0000FF: Blue, FFFF00: Yellow, FFFFFFFF: White, 008000: Medium intensity green.
Complete	boolean		Component's operation cycle has completed. Used only in event notifications, where it is always true.
ConnectedTime	decimal	s	Time since logical connection established
connectorCode	OptionList		A value of ConnectorEnumType (See part 2). Specific type of connector, including sub-variant information. NOTE: Distinct and orthogonal to Charging Protocol, Power Type, Phases.
Count	integer		General purpose integer count variable for Component state reporting
Currency	string		Currency used by this Charging Station in a ISO 4217 formatted currency code.
CurrentImbalance	decimal	Percent	Percentage current imbalance in an AC three phase supply.
DateTime	dateTime		Point in time value, in [RFC3339] datetime format. Time zone optional.
DCCurrent	decimal	A	DC Current (in amperes). May be an instantaneous measurement, or a period average, depending on context/equipment.
DCVoltage	decimal	V	DC Voltage (volts). May be an instantaneous measurement, or a period average, depending on context/equipment.
ECVariant	string		Production series variants reflecting internal design changes or sub-component substitutions not affecting external functionality.
Enabled	boolean		The Component is Enabled for operation. For Available components that cannot be selectively (remotely) enabled / disabled, this value is always true. Note: Available cannot be false if Enabled is true, so during inventory reporting, Enabled=1 also logically states Available=true
Energy	decimal	Wh	Energy quantity (in Wh) for reporting/configuring values related to stored energy (i.e. not transferred energy).
EnergyExport	decimal	Wh	Total energy transferred: e.g. from EV during (ongoing or terminated) charging session (in kWh by default)
EnergyExportRegister	decimal	Wh	Cumulative export kWh register value, such as from a (certified) fiscal energy meter.
EnergyImport	decimal	Wh	Total energy transferred.
EnergyImportRegister	decimal	Wh	Cumulative export kWh register value, such as from a (certified) fiscal energy meter.
Entries	integer		General purpose variable for reporting/managing numbers of entries in repetitive data structures. maxLimit characteristic reports maximum possible entries.
EVConnectionTimeout	integer		Interval from between "starting" of a transaction until incipient transaction is automatically canceled, due to failure of EV driver to (correctly) insert the charging cable connector(s) into the appropriate socket(s). The Charging Station SHALL go back to the original state, probably: 'Available'. "Starting" might be the swiping of the RFID, pressing a start button, a RequestStartTransactionRequest being received etc.
Fallback	boolean		Component is operating in a fallback, or backup mode. In inventory reports, a Value of 1 for the maxLimit characteristic indicates that the component can enter a fallback state (i.e. a fallback mode is present).
FanSpeed	decimal	RPM	Fan Speed (in RPM). A value of 0 represents stopped/stalled. An empty value indicates that fan speed cannot be read.
FileTransferProtocols	MemberList		Supported file transfer protocols. Allowed values: FTP, FTPS, HTTP, HTTPS, SFTP.
Force	decimal	N	Reports (impact) force/ acceleration values (estimates) in one or more directions, in units of Newtons or "g". Multiple force readings in different (orthogonal) dimensions may be reported using Variable instance values, such as Down, Right, Forward.
Formats	MemberList		List of message formats supported by this Charging Station. Possible values: ASCII, HTML, URI, UTF-8.
Frequency	decimal	Hz	Frequency of AC power, signal, or component operation.
FuseRating	decimal	A	Current rating of a fuse/breaker. Variable instances keyed by phase identifier (L1/L2/L3/N).
Height	decimal	m	Height above(+)/below(-) reference level (ground level unless context demands otherwise).
Humidity	decimal	RH	The relative humidity in %.

Appendix 4. Standardized Variables

Name	Data Type	Unit	Description
Hysteresis	decimal	Percent	Specifies the width of a "dead band" (as a percentage of the threshold) around the central value of a threshold setting (e.g. MinSet, MaxSet, monitor thresholds) to avoid repeated triggering when the measured quantity lies close to the threshold and is subject to small variations.
ICCID	string		ICCID (Integrated Circuit Card Identifier) of mobile data SIM card.
Identity	string		Identity of the Charging Station. Length compatible with EVSE ID definition from [EMI3] "Part 2: business objects".
Impedance	decimal	Ohm	Impedance: Primary value is real (resistive only) impedance. Where a complex impedance is to be reported, the imaginary part (reactance) must be represented with a separate Variable instance value of "reactance". Reactance values are expressed at the (nominal) relevant operating frequency of the Component (e.g. 50/60Hz for mains electricity feed).
IMSI	string		IMSI (International Mobile Subscriber Identity) number of mobile data SIM card
Interval	integer	s	Minimum Interval (in seconds) between (attempted) operations.
ItemsPerMessage	integer		Message Size (in primary repeating items) - maxLimit used to report constraint on message size.
Length	decimal		General Purpose linear distance measure.
LifeTime	integer	s	Specifies how long (in seconds) after its last use until a token expires and is removed from the authorization cache.
Light	decimal	lx	(Ambient) light level. The value is in Lux.
ActiveNetworkProfile	integer		Configuration profile (index number) currently in use for communication to CSMS.
LocalAuthorizeOffline	boolean		Specifies whether the Charging Station, when Offline, will start a transaction for locally-authorized identifiers.
LocalPreAuthorize	boolean		Specifies whether the Charging Station, when online, will start a transaction for locally-authorized identifiers without waiting for or requesting an AuthorizeResponse from the CSMS.
Manufacturer	string		Component Manufacturer name
MasterPassGroupId	string		IdTokens that have this id as groupId belong to the Master Pass Group, meaning they can stop any ongoing transaction, but cannot start transactions. This can, for example, be used by law enforcement personal to stop any ongoing transaction when an EV has to be towed away.
MaxEnergyOnInvalidId	integer		Maximum energy (in Wh) delivered when an identifier is invalidated by the CSMS after start of a transaction. If supported, this allows an operator to provide an EV with a limited amount of energy so it is able to drive away.
Measurands	OptionList		A value of MeasurandEnumType (See part 2). Measurand(s) to be included in MeterValuesRequest. For all the allowed values see: Measurand. The Charging Station might report a limited set of these Measurands via VariableCharacteristicsType.valuesList. This way the CSMS knows which Measurands it can specify.
Message	string		Specific stored message for display.
MessageAttempts	integer		Number of times the Charging Station should try to submit a TransactionEventRequest message when the CSMS fails to process it.
MinimumStatusDuration	integer	s	Minimum duration that a Charging Station or EVSE status is stable before StatusNotificationRequest is sent to the CSMS.
Mode	string		Operating mode string from among valid options (communicated by OptionList, etc. during capability/configuration discovery).
Model	string		Manufacturer's Model code/number of Component, including suffixes etc. to identify functional, regional or linguistic variation, but NOT engineering change level internal variation not affecting external behaviour, etc.
NonEvseSpecific	boolean		If this configuration key is present and set to true: Charging Station supports Reservation on evse 0.
NetworkConfigurationPriority	ValueList		A comma separated ordered list of the priority of the possible Network Connection Profiles. The list of possible available profile slots for the network configuration profiles SHALL be reported, via the valueList characteristic of this Variable. Allowed values: DHCP, manual.
NetworkProfileConnectionAttempts	integer		Specifies the number of connection attempts the Charging Station executes before switching to a different profile.
NextTimeOffsetTransitionDateTime	dateTime		Date time of the next time offset transition. Format [RFC3339].

Appendix 4. Standardized Variables

Name	Data Type	Unit	Description
NotifyChargingLimitWithSchedules	boolean		Indicates if the Charging Station should include the externally set charging limit/schedule in the message when it sends a NotifyChargingLimitRequest message. This might increase the data usage significantly, especially when an external system sends new profiles/limits with a short interval. Default is false when omitted.
NtpServerUri	string		Address of the NTP server. Multiple NTP servers can be configured as backups, etc. If the NTP client supports it, it can also connect to multiple NTP servers simultaneous to get a more reliable time source. Variable instance value is single digit NTP priority (1=highest).
NtpSource	OptionList		Specifies whether the NTP server URI is to be taken from DHCP or manual.
Operated	boolean		The Component operated in an instantaneous, transient, or immediately self-resetting pattern. Used only in event notifications, where it is always true.
OperatingTimes	string		Recurring operating times in iCalendar RRULE format.
OrganizationName	string		Organization name to be used for checking security certificates.
Overload	boolean		Component is in Overload state.
Percent	decimal	Percent	Generic dimensionless value reporting/setting value.
PeriodsPerSchedule	integer		The maxLimit characteristic specifies the maximum allowed number of periods that may be defined per ChargingSchedule.
PersonalMessageSize	integer		Max size (in characters) of the personal message element of the IdTokenInfo data (0 specifies no personal data may be stored).
PhaseRotation	OptionList		The phase wiring of Component, relative to it's upstream feed Component/device. Allowed values: NotApplicable (for Single phase or DC Charging Stations) Unknown (not (yet) known) RST (Standard Reference Phasing) RTS (Reversed Reference Phasing) SRT (Reversed 240 degree rotation) STR (Standard 120 degree rotation) TRS (Standard 240 degree rotation) TSR (Reversed 120 degree rotation)
Policy	OptionList		Cache Entry Replacement Policy: (LRU,LFU) LeastRecentlyUsed or LeastFrequentlyUsed. Allowed values: LRU, LFU.
PostChargingTime	decimal	s	Elapsed time in seconds since last substantive energy transfer
Power	decimal	W,kW	Instantaneous (real) Power (measured/calculated, including power factor for AC). Where a component (e.g. AC to DC Power Converter) has multiple power measurements, the default (unkeyed) instance is "input" power.
Priorities	MemberList		List of the priorities supported by this Charging Station. Possible values: MessagePriority. Allowed values: AlwaysFront, InFront, NormalCycle.
Problem	boolean		Component itself has a "Problem" condition that impacts in any significant way on its normal operation. By definition, "Problem" state includes (logical OR) "Fault" state. "Problem" specifically INCLUDES inability to operate that is propagated (up/down/sideways) from any other associated/connected/containing/contained Component.
Protecting	boolean		Applies to "sensor" type Components that have an associated protection capability, whereby they can disconnect power (e.g. using the main PowerContactor) if the sensed quantity is outside preset/configured limits. If Protecting is true, the Component is actively preventing/interrupting charging.
RateUnits	MemberList		A list of supported quantities for use in a ChargingSchedule. Allowed values: 'A' and 'W'
SerialNumber	string		Serial number of Component.
SignalStrength	decimal	dBm	(Radio/Wired/Optical) data signal strength, in ASU (typically 0-31 or 99 for unknown). Or dbmW (typically -140 to -50).
SignReadings	boolean		If set to true, the Charging Station SHALL include signed meter values in the SampledValueType in the MeterValuedRequest and TransactionEventRequest to the CSMS. When a Charging Station does not support signed meter values it SHALL not report this variable.
State	string		A state code or name identifier string, to allow the internal state of components to be reported and/or controlled
StateOfCharge	decimal	Percent	Energy Storage Device (e.g. battery) state of charge, expressed as a percentage of nominal design 0-100% operating range. Note: Values below or above 0-100% are possible and represent over discharged/charged states.

Appendix 4. Standardized Variables

Name	Data Type	Unit	Description
StopTxOnInvalidId	boolean		Specifies whether the Charging Station will stop an ongoing transaction when it receives a non-Accepted authorization status in TransactionEventResponse for this transaction
StopTxOnEVDisconnect	boolean		When set to true, the Charging Station SHALL administratively stop the transaction when the cable is unplugged from the EV.
Storage	integer	B	In bytes. Amount of storage occupied. Storage(maxLimit) specifies absolute limit Storage(MaxSet) restricts usage to specified Max, if supported.
SupplyPhases	integer		Number of alternating current phases connected/available. 1 or 3 for AC, 0 means DC (no alternating phases). Null value indicates that the number of phases (e.g. in use) is unknown.
Suspending	boolean		If Suspending is true, the Component can is currently suspending charging.
Suspension	boolean		Applies to "sensor" type Components that have a charging suspension capability, typically for safety or equipment protection reasons. If Suspension is true, the component can suspend charging when the sensed quantity is outside preset/configured limits.
Temperature	decimal	Celsius, Fahrenheit	Temperature(s) of component (in Celsius, by default). Components may have multiple indexed temperature sensors.
Time	dateTime		Point in time value, in ISO 8601 datetime format. Time zone optional.
TimeOffset	string		A Time Offset with respect to Coordinated Universal Time (aka UTC or Greenwich Mean Time) in the form of an [RFC3339] time (zone) offset suffix, including the mandatory "+" or "-" prefix.
Timeout	decimal	s	Generic timeout value for Component operation (in seconds).
TimeSource	SequenceList		Describes/configures a priority list of time sources that may be used by the Charging Station. Allowed values: HeartBeat, NTP, GPS, RealTimeClock, MobileNetwork.
TimeZone	string		Configured current local time zone in the conventional Continent/City format, for display purposes only. TimeZone could conflict with TimeOffset: if both are supported then it is RECOMMENDED to not use both at the same time. Time zone information in either form is used for display purposes only: the Charging Station SHALL always use UTC in all OCPP messages.
TxStartPoint	OptionList		Defines when the Charging Station starts a new transaction: first transactioneventRequest: eventType = Started. When any event in the given list occurs, the Charging Station SHALL start a transaction. The Charging Station SHALL only send the Started event once for every transaction. It is advised to put all events that should be part of a transaction in the list, in case the start event never occurs. Because the possible events don't always have to come in the same order it is possible to provide a list of events. Which ever comes first will then cause a transaction to be started. For example: EVConnected,Authorized would mean that a transaction is started when an EV is detected (Cable is connected), or when an EV Driver swipes his RFID card en the CSMS successfully authorizes the ID for charging. Allowed values: ParkingBayOccupancy, EVConnected, Authorized, DataSigned, PowerPathClosed, EnergyTransfer.
TxStopPoint	OptionList		Defines when the Charging Station ends a transaction: last transactioneventRequest: eventType = Ended. When any event in the given list is no longer valid, the Charging Station SHALL end the transaction. The Charging Station SHALL only send the Ended event once for every transaction. Allowed values: ParkingBayOccupancy, EVConnected, Authorized, DataSigned, PowerPathClosed, EnergyTransfer.
Attempts	integer		Number of attempts (INCLUDING the original attempt) in the last successful, or attempted, cycle of operation. Applies typically to self-monitoring motorized electro-mechanical equipment, etc. {Null}: Unknown 0: Not Attempted/Not allowed 1: Single attempt/No retries [allowed] 2-N: [up to] N tries [allowed]
Tripped	boolean		Single-shot device requires explicit intervention to re-prime/activate to normal.
ValueSize	integer		Used with maxLimit to report allowed maximum data value size (e.g. strings).
VersionDate	dateTime		[RFC3339]
VersionNumber	string		Version Number of software/firmware
VoltageImbalance	decimal	Percent	Percentage voltage imbalance in three phase supply.