NAME	FIELD TYPE	CARD.	DESCRIPTION
readonly	boolean	1..1	Required. False if the value can be set with the ChangeConfiguration message.
value	CiString500Type	0..1	Optional. If key is known but not set, this field may be absent.

7.30. Location

Enumeration

Allowable values of the optional "location" field of a value element in SampledValue.

VALUE	DESCRIPTION
Body	Measurement inside body of Charge Point (e.g. Temperature)
Cable	Measurement taken from cable between EV and Charge Point
EV	Measurement taken by EV
Inlet	Measurement at network (“grid”) inlet connection
Outlet	Measurement at a Connector. Default value

7.31. Measurand

Enumeration

Allowable values of the optional "measurand" field of a Value element, as used in MeterValues.req and StopTransaction.req messages. Default value of "measurand" is always "Energy.Active.Import.Register"

Import is energy flow from the Grid to the Charge Point, EV or other load. Export is energy flow from the EV to the Charge Point and/or from the Charge Point to the Grid.

VALUE	DESCRIPTION
Current.Export	Instantaneous current flow from EV
Current.Import	Instantaneous current flow to EV
Current.Offered	Maximum current offered to EV
Energy.Active.Export.Register	Numerical value read from the "active electrical energy" (Wh or kWh) register of the (most authoritative) electrical meter measuring energy exported (to the grid).
Energy.Active.Import.Register	Numerical value read from the "active electrical energy" (Wh or kWh) register of the (most authoritative) electrical meter measuring energy imported (from the grid supply).

VALUE	DESCRIPTION
Energy.Reactive.Export.Register	Numerical value read from the "reactive electrical energy" (VARh or kVARh) register of the (most authoritative) electrical meter measuring energy exported (to the grid).
Energy.Reactive.Import.Register	Numerical value read from the "reactive electrical energy" (VARh or kVARh) register of the (most authoritative) electrical meter measuring energy imported (from the grid supply).
Energy.Active.Export.Interval	Absolute amount of "active electrical energy" (Wh or kWh) exported (to the grid) during an associated time "interval", specified by a Metervalues ReadingContext, and applicable interval duration configuration values (in seconds) for "ClockAlignedDataInterval" and "MeterValueSampleInterval".
Energy.Active.Import.Interval	Absolute amount of "active electrical energy" (Wh or kWh) imported (from the grid supply) during an associated time "interval", specified by a Metervalues ReadingContext, and applicable interval duration configuration values (in seconds) for "ClockAlignedDataInterval" and "MeterValueSampleInterval".
Energy.Reactive.Export.Interval	Absolute amount of "reactive electrical energy" (VARh or kVARh) exported (to the grid) during an associated time "interval", specified by a Metervalues ReadingContext, and applicable interval duration configuration values (in seconds) for "ClockAlignedDataInterval" and "MeterValueSampleInterval".
Energy.Reactive.Import.Interval	Absolute amount of "reactive electrical energy" (VARh or kVARh) imported (from the grid supply) during an associated time "interval", specified by a Metervalues ReadingContext, and applicable interval duration configuration values (in seconds) for "ClockAlignedDataInterval" and "MeterValueSampleInterval".
Frequency	Instantaneous reading of powerline frequency. NOTE: OCPP 1.6 does not have a UnitOfMeasure for frequency, the UnitOfMeasure for any SampledValue with measurand: Frequency is Hertz.
Power.Active.Export	Instantaneous active power exported by EV. (W or kW)
Power.Active.Import	Instantaneous active power imported by EV. (W or kW)
Power.Factor	Instantaneous power factor of total energy flow
Power.Offered	Maximum power offered to EV
Power.Reactive.Export	Instantaneous reactive power exported by EV. (var or kvar)
Power.Reactive.Import	Instantaneous reactive power imported by EV. (var or kvar)
RPM	Fan speed in RPM
SoC	State of charge of charging vehicle in percentage
Temperature	Temperature reading inside Charge Point.
Voltage	Instantaneous AC RMS supply voltage

All "Register" values relating to a single charging transaction, or a non-transactional consumer (e.g. charge point internal power supply, overall supply) MUST be monotonically increasing in time.

The actual quantity of energy corresponding to a reported ".Register" value is computed as the register value in question minus the register value recorded/reported at the start of the transaction or other relevant starting reference point in time. For improved auditability, ".Register" values SHOULD reported exactly as they are directly read from a non-volatile register in the electrical metering hardware, and SHOULD NOT be re-based to zero at the start of transactions. This allows any "missing energy" between sequential transactions, due to hardware fault, mis-wiring, fraud, etc. to be identified, by allowing the Central System to confirm that the starting register value of any transaction is identical to the finishing register value of the preceding transaction on the same connector.

7.32. MessageTrigger

Enumeration

Type of request to be triggered in a TriggerMessage.req.

VALUE	DESCRIPTION
BootNotification	To trigger a BootNotification request
DiagnosticsStatusNotification	To trigger a DiagnosticsStatusNotification request
FirmwareStatusNotification	To trigger a FirmwareStatusNotification request
Heartbeat	To trigger a Heartbeat request
MeterValues	To trigger a MeterValues request
StatusNotification	To trigger a StatusNotification request

7.33. MeterValue

Class

Collection of one or more sampled values in MeterValues.req and StopTransaction.req. All sampled values in a MeterValue are sampled at the same point in time.

FIELD NAME	FIELD TYPE	CARD.	DESCRIPTION
timestamp	dateTime	1..1	Required. Timestamp for measured value(s).
sampledValue	SampledValue	1..*	Required. One or more measured values

7.34. Phase

Enumeration

Phase as used in SampledValue. Phase specifies how a measured value is to be interpreted. Please note that not all values of Phase are applicable to all Measurands.

VALUE	DESCRIPTION
L1	Measured on L1
L2	Measured on L2
L3	Measured on L3
N	Measured on Neutral
L1-N	Measured on L1 with respect to Neutral conductor
L2-N	Measured on L2 with respect to Neutral conductor
L3-N	Measured on L3 with respect to Neutral conductor
L1-L2	Measured between L1 and L2
L2-L3	Measured between L2 and L3
L3-L1	Measured between L3 and L1

7.35. ReadingContext

Enumeration

Values of the context field of a value in SampledValue.

VALUE	DESCRIPTION
Interruption.Begin	Value taken at start of interruption.
Interruption.End	Value taken when resuming after interruption.
Other	Value for any other situations.
Sample.Clock	Value taken at clock aligned interval.
Sample.Periodic	Value taken as periodic sample relative to start time of transaction.
Transaction.Begin	Value taken at start of transaction.

VALUE	DESCRIPTION
Transaction.End	Value taken at end of transaction.
Trigger	Value taken in response to a TriggerMessage.req

7.36. Reason

Enumeration

Reason for stopping a transaction in StopTransaction.req.

VALUE	DESCRIPTION
DeAuthorized	The transaction was stopped because of the authorization status in a StartTransaction.conf
EmergencyStop	Emergency stop button was used.
EVDisconnected	disconnecting of cable, vehicle moved away from inductive charge unit.
HardReset	A hard reset command was received.
Local	Stopped locally on request of the user at the Charge Point. This is a regular termination of a transaction. Examples: presenting an RFID tag, pressing a button to stop.
Other	Any other reason.
PowerLoss	Complete loss of power.
Reboot	A locally initiated reset/reboot occurred. (for instance watchdog kicked in)
Remote	Stopped remotely on request of the user. This is a regular termination of a transaction. Examples: termination using a smartphone app, exceeding a (non local) prepaid credit.
SoftReset	A soft reset command was received.
UnlockCommand	Central System sent an Unlock Connector command.

7.37. RecurrencyKindType

Enumeration

Type of recurrence of a charging profile, as used in ChargingProfile.

VALUE	DESCRIPTION
Daily	The schedule restarts every 24 hours, at the same time as in the startSchedule.

VALUE	DESCRIPTION
Weekly	The schedule restarts every 7 days, at the same time and day-of-the-week as in the startSchedule.

7.38. RegistrationStatus

Enumeration

Result of registration in response to BootNotification.req.

VALUE	DESCRIPTION
Accepted	Charge point is accepted by Central System.
Pending	Central System is not yet ready to accept the Charge Point. Central System may send messages to retrieve information or prepare the Charge Point.
Rejected	Charge point is not accepted by Central System. This may happen when the Charge Point id is not known by Central System.

7.39. RemoteStartStopStatus

Enumeration

The result of a RemoteStartTransaction.req or RemoteStopTransaction.req request.

VALUE	DESCRIPTION
Accepted	Command will be executed.
Rejected	Command will not be executed.

7.40. ReservationStatus

Enumeration

Status in ReserveNow.conf.

VALUE	DESCRIPTION
Accepted	Reservation has been made.
Faulted	Reservation has not been made, because connectors or specified connector are in a faulted state.
Occupied	Reservation has not been made. All connectors or the specified connector are occupied.
Rejected	Reservation has not been made. Charge Point is not configured to accept reservations.

VALUE	DESCRIPTION
Unavailable	Reservation has not been made, because connectors or specified connector are in an unavailable state.

7.41. ResetStatus

Enumeration

Result of Reset.req.

VALUE	DESCRIPTION
Accepted	Command will be executed.
Rejected	Command will not be executed.

7.42. ResetType

Enumeration

Type of reset requested by Reset.req.

VALUE	DESCRIPTION
Hard	Restart (all) the hardware, the Charge Point is not required to gracefully stop ongoing transaction. If possible the Charge Point sends a StopTransaction.req for previously ongoing transactions after having restarted and having been accepted by the Central System via a BootNotification.conf. This is a last resort solution for a not correctly functioning Charge Point, by sending a "hard" reset, (queued) information might get lost.
Soft	Stop ongoing transactions gracefully and sending StopTransaction.req for every ongoing transaction. It should then restart the application software (if possible, otherwise restart the processor/controller).

7.43. SampledValue

Class

Single sampled value in MeterValues. Each value can be accompanied by optional fields.

FIELD NAME	FIELD TYPE	CARD.	DESCRIPTION
value	String	1..1	Required. Value as a “Raw” (decimal) number or “SignedData”. Field Type is “string” to allow for digitally signed data readings. Decimal numeric values are also acceptable to allow fractional values for measurands such as Temperature and Current.
context	ReadingContext	0..1	Optional. Type of detail value: start, end or sample. Default = “Sample.Periodic”
format	ValueFormat	0..1	Optional. Raw or signed data. Default = “Raw”
measurand	Measurand	0..1	Optional. Type of measurement. Default = “Energy.Active.Import.Register”

FIELD NAME	FIELD TYPE	CARD.	DESCRIPTION
phase	Phase	0..1	Optional. indicates how the measured value is to be interpreted. For instance between L1 and neutral (L1-N) Please note that not all values of phase are applicable to all Measurands. When phase is absent, the measured value is interpreted as an overall value.
location	Location	0..1	Optional. Location of measurement. Default=”Outlet”
unit	UnitOfMeasure	0..1	Optional. Unit of the value. Default = “Wh” if the (default) measurand is an “Energy” type.

7.44. TriggerMessageStatus

Enumeration

Status in TriggerMessage.conf.

VALUE	DESCRIPTION
Accepted	Requested notification will be sent.
Rejected	Requested notification will not be sent.
NotImplemented	Requested notification cannot be sent because it is either not implemented or unknown.

7.45. UnitOfMeasure

Enumeration

Allowable values of the optional "unit" field of a Value element, as used in SampledValue. Default value of "unit" is always "Wh".

VALUE	DESCRIPTION
Wh	Watt-hours (energy). Default.
kWh	kiloWatt-hours (energy).
varh	Var-hours (reactive energy).
kvarh	kilovar-hours (reactive energy).
W	Watts (power).
kW	kilowatts (power).
VA	VoltAmpere (apparent power).

VALUE	DESCRIPTION
kVA	kiloVolt Ampere (apparent power).
var	Vars (reactive power).
kvar	kilovars (reactive power).
A	Amperes (current).
V	Voltage (r.m.s. AC).
Celsius	Degrees (temperature).
Fahrenheit	Degrees (temperature).
K	Degrees Kelvin (temperature).
Percent	Percentage.

7.46. UnlockStatus

Enumeration

Status in response to UnlockConnector.req.

VALUE	DESCRIPTION
Unlocked	Connector has successfully been unlocked.
UnlockFailed	Failed to unlock the connector: The Charge Point has tried to unlock the connector and has detected that the connector is still locked or the unlock mechanism failed.
NotSupported	Charge Point has no connector lock, or ConnectorId is unknown.

7.47. UpdateStatus

Enumeration

Type of update for a SendLocalList.req.

VALUE	DESCRIPTION
Accepted	Local Authorization List successfully updated.
Failed	Failed to update the Local Authorization List.

VALUE	DESCRIPTION
NotSupported	Update of Local Authorization List is not supported by Charge Point.
VersionMismatch	Version number in the request for a differential update is less or equal then version number of current list.

7.48. UpdateType

Enumeration

Type of update for a SendLocalList.req.

VALUE	DESCRIPTION
Differential	Indicates that the current Local Authorization List must be updated with the values in this message.
Full	Indicates that the current Local Authorization List must be replaced by the values in this message.

7.49. ValueFormat

Enumeration

Format that specifies how the value element in SampledValue is to be interpreted.

VALUE	DESCRIPTION
Raw	Data is to be interpreted as integer/decimal numeric data.
SignedData	Data is represented as a signed binary data block, encoded as hex data.

8. Firmware and Diagnostics File Transfer

This section is normative.

The supported transfer protocols are controlled by the configuration key *SupportedFileTransferProtocols*. FTP, FTPS, HTTP, HTTPS (CSL)

8.1. Download Firmware

When a Charge Point is notified about new firmware, it needs to be able to download this firmware. The Central System supplies in the request an URL where the firmware can be downloaded. The URL also contains the protocol which must be used to download the firmware.

It is recommended that the firmware is downloaded via FTP or FTPS. FTP(S) is better optimized for large binary data than HTTP. Also FTP(S) has the ability to resume downloads. In case a download is interrupted, the Charge Point can resume downloading after the part it already has downloaded. The FTP URL is of format: *ftp://user*:*password*@*host*:*port*/*path* in which the parts *user*:*password*@, :*password* or :*port* may be excluded.

To ensure that the correct firmware is downloaded, it is RECOMMENDED that the firmware is also digitally signed.

8.2. Upload Diagnostics

When a Charge Point is requested to upload a diagnostics file, the Central System supplies in the request an URL where the Charge Point should upload the file. The URL also contains the protocol which must be used to upload the file.

It is recommended that the diagnostics file is downloaded 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 Charge Point 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.

9. Standard Configuration Key Names & Values

Below follows a list of all configuration keys with a role standardized in this specification. The list is separated by Feature Profiles. A required configuration key mentioned under a particular profile only has to be supported by the Charge Point if it supports that profile.

For optional Configuration Keys with a boolean type, the following rules apply for the configuration key in the response to a GetConfiguration.req without a list of keys:

- If the key is present, the Charge Point provides the functionality that is configured by the key, and it can be enabled or disabled by setting the value for the key.
- If the key is not present, the Charge Point does not provide the functionality that can be configured by the key.

The "Accessibility" property shows if the value for a certain configuration key is read-only ("R") or read-write ("RW"). In case the key is read-only, the Central System can read the value for the key using GetConfiguration, but not write it. In case the accessibility is read-write, the Central System can also write the value for the key using ChangeConfiguration.

9.1. Core Profile

9.1.1. `AllowOfflineTxForUnknownId`

Required/optional	optional
Accessibility	RW
Type	boolean
Description	If this key exists, the Charge Point supports Unknown Offline Authorization. If this key reports a value of *true*, Unknown Offline Authorization is enabled.

9.1.2. `AuthorizationCacheEnabled`

Required/optional	optional
Accessibility	RW
Type	boolean
Description	If this key exists, the Charge Point supports an Authorization Cache. If this key reports a value of *true*, the Authorization Cache is enabled.

9.1.3. `AuthorizeRemoteTxRequests`

Required/optional	required

Accessibility	R or RW. Choice is up to Charge Point implementation.
Type	boolean
Description	Whether a remote request to start a transaction in the form of a RemoteStartTransaction.req message should be authorized beforehand like a local action to start a transaction.

9.1.4. BlinkRepeat

Required/optional	optional
Accessibility	RW
Type	integer
Unit	times
Description	Number of times to blink Charge Point lighting when signalling

9.1.5. ClockAlignedDataInterval

Required/optional	required
Accessibility	RW
Type	integer
Unit	seconds
Description	Size (in seconds) of the clock-aligned data interval. This is the size (in seconds) of the set of evenly spaced aggregation intervals per day, starting at 00:00:00 (midnight). For example, a value of 900 (15 minutes) indicates that every day should be broken into 96 15-minute intervals. When clock aligned data is being transmitted, the interval in question is identified by the start time and (optional) duration interval value, represented according to the ISO8601 standard. All "per-period" data (e.g. energy readings) should be accumulated (for "flow" type measurands such as energy), or averaged (for other values) across the entire interval (or partial interval, at the beginning or end of a Transaction), and transmitted (if so enabled) at the end of each interval, bearing the interval start time timestamp. A value of "0" (numeric zero), by convention, is to be interpreted to mean that no clock-aligned data should be transmitted.

9.1.6. ConnectionTimeOut

Required/optional	required
Accessibility	RW
Type	integer
Unit	seconds

Description	Interval *from beginning of status: 'Preparing' 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 Charge Point SHALL go back to the original state, probably: 'Available'.

9.1.7. `ConnectorPhaseRotation`

Required/optional	required
Accessibility	RW
Type	CSL
Description	The phase rotation per connector in respect to the connector's electrical meter (or if absent, the grid connection). Possible values per connector are: `NotApplicable` (for Single phase or DC Charge Points) `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) R can be identified as phase 1 (L1), S as phase 2 (L2), T as phase 3 (L3). If known, the Charge Point MAY also report the phase rotation between the grid connection and the main energymeter by using index number Zero (0). Values are reported in CSL, formatted: 0.RST, 1.RST, 2.RTS

9.1.8. `ConnectorPhaseRotationMaxLength`

Required/optional	optional
Accessibility	R
Type	integer
Description	Maximum number of items in a `ConnectorPhaseRotation` Configuration Key.

9.1.9. `GetConfigurationMaxKeys`

Required/optional	required
Accessibility	R
Type	integer
Description	Maximum number of requested configuration keys in a GetConfiguration.req PDU.

9.1.10. `HeartbeatInterval`

Required/optional	required

Accessibility	RW
Type	integer
Unit	seconds
Description	Interval of inactivity (no OCPP exchanges) with central system after which the Charge Point should send a Heartbeat.req PDU

9.1.11. LightIntensity

Required/optional	optional
Accessibility	RW
Type	integer
Unit	%
Description	Percentage of maximum intensity at which to illuminate Charge Point lighting

9.1.12. LocalAuthorizeOffline

Required/optional	required
Accessibility	RW
Type	boolean
Description	whether the Charge Point, when *offline*, will start a transaction for locally-authorized identifiers.

9.1.13. LocalPreAuthorize

Required/optional	required
Accessibility	RW
Type	boolean
Description	whether the Charge Point, when online, will start a transaction for locally-authorized identifiers without waiting for or requesting an Authorize.conf from the Central System

9.1.14. MaxEnergyOnInvalidId

Required/optional	optional