ABB specific vendor error codes extensions for OCPP 1.6 Status Notification message

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1. **Version history**

Revision	Date	Reasons for revision	Author
1.0	12 February 2019	Initial document created	Mikhail Kireev, ABB
1.1	07 June 2021	Main text rewritten, additional error codes added, table format reworked.	Mikhail Kireev, ABB Christof Kaiser, ABB
1.1.1	10 June 2021	Refernce to software versions added, language and formatting errors corrected.	Mikhail Kireev, ABB Christof Kaiser, ABB
1.2	10 November 2021	Added "Customer Action", Review of stop reasons, Editorial changes.	Christof Kaiser, ABB
1.3	4 Feburary 2021	Detail changes, e.g. threshold voltages included.	Christof Kaiser, ABB
	18 February 2021	Detail changes	Christof Kaiser, ABB

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2. Status notifications

2.1. Message format

ABB has implemented StatusNotification message according to the OCPP 1.6 specification
[1].

The StatusNotification.req message has the option to add vendor specific information, using
the fields vendorId, vendorErrorCode and info. ABB opted to use the fields vendorErrorCode
to provide additional information.

FIELD NAME	FIELD TYPE	CARD.	DESCRIPTION
connectorId	integer connectorId >= 0	1..1	Required. The id of the connector for which the status is reported. Id '0' (zero) is used if the status is for the Charge Point main controller.
errorCode	ChargePointErrorCode	1..1	Required. This contains the error code reported by the Charge Point.
info	CiString50Type	0..1	Optional. Additional free format information related to the error.
status	ChargePointStatus	1..1	Required. This contains the current status of the Charge Point.

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FIELD NAME	FIELD TYPE	CARD.	DESCRIPTION
timestamp	dateTime	0..1	Optional. The time for which the status is reported. If absent time of receipt of the message will be assumed.
vendorId	CiString255Type	0..1	Optional. This identifies the vendor-specific implementation.
vendorErrorCode	CiString50Type	0..1	Optional. This contains the vendor-specific error code.

Field info has the same length as vendorErrorCode: 50 characters. ABB has decided that it
is not enough to provide extensive description within this limitation. Therefore the info field is
left empty. Instead, this document was created to provide more information about each
vendorErrorCode value.

This is example of a StatusNotification message with an additional code in the
vendorErrorCode field:

{"connectorId":1,
"errorCode":"OtherError",
"vendorId":"com.abb.evci/event/v1",
"vendorErrorCode":"StopReason:SoftError",

"info":"",
"status":"Faulted",
"timestamp":"2020-12-22T09:47:36.523Z"}

An event will cause a StatusNotification message with respective status to be sent, where the vendor specific fields will provide more information.

In the example above there is a message with the status "Faulted" and the vendorErroCode "StopReason:SoftError", providing mapping to additional information that can be found in this document.

Some notes on the values for other fields of the StatusNotification message:

1. The mandatory field errorCode contains the OCPP compliant code with best possible mapping according to type ChargePointErrorCode. If no mapping could be done, the value "OtherError" is used.
2. vendorErrorCode in StatusNotification.req is used in addition to the "regular" errorCode. If both of them are populated, the on vendorErrorCode will be more accurate than errorCode.
3. As any standard StatusNotification message, the vendor specific implementation uses the connector id to indicate the connector involved as well, where connectorId=0 is for the charger as such if the message is not related to a particular connector.

2.2. When message is sent

Please note that StatusNotification messages are not guaranteed; they are not transactional messages according to OCPP definition. That means that they will only be sent when the connection to the Central System is available at the time of the event. If event or status change has happened during time of disconnection, the StatusNotification.req is not buffered and will not be sent when charger is connected to Central system again.

According to the OCPP specification "A Charge Point sends a notification to the Central System to inform the Central System about a status change or an error within the Charge Point." [1]

However, there could be the case when an event happened which neither leads to a status change nor can be considered an error, but the information about such event is still useful. In such a case ABB decided to still send the StatusNotification message but with the same status of the charger or connector as it was sent before.

For example, if the charger was in "Available" state, a StatusNotifciation with the same status "Available" will be sent again, but with additional information in the field vendorErrorCode.

Please also take into account that information in vendorErrorCode is present not only when status is "Faulted". There are situations when there is no charger failure and the charger operates as expected, but e.g. the error is related to the vehicle. In such cases additional information is provided with other statuses as well.

Known issue: A StatusNotification with the same status and vendorErrorCode might be sent more than once. This should not have a big impact on system behavior and ABB plans to fix it in one of the next software releases.

2.3. **Relation of vendorErrorCode to stop reason in ABB Web tools**

Values in vendorErrorCode of OCPP StatusNotification message directly correlate to the values of „Stop Reason Detailed" for charging sessions in ABB WebTools.

Charge sessions can be found in the „Charge session" tab of a charger in the webtool:

"Stop Reason Detailed" carries the same information, but has a slightly different format.

In OCPP vendorErrorCodeField, every stop reason is preceded with the string „StopReason:" followed by the actual reason which transformed to CamelCase.

Here are some examples of mapping stop reasons to vendorErroCodes:

Web Interface "Stop Reason Detailed"	OCPP "vendorErroCode"
SR_VEHICLE_STOP	StopReason:VehicleStop
SR_VEHICLE_NOT_CONNECTED	StopReason:VehicleNotConnected
Normal Stop	StopReason:NormalStop

Note that in the web interface, there are fields "Stop Reason" and "Stop Reason Detailed". Only the latter is translated to OCPP, although the prefix is "StopReason:" (so without "Detailed").

There can be other vendorErrorCodes which are not prefixed by "StopReason:" in the future.

2.4. **Charger Software versions**

Below is overview of charger software versions in which StatusNotification messages are supported with additional information in vendorErrorCodes.

For software versions earlier than specified below please see version 1.0 of this document.

Charger Model	First software version where supported
Terra T54	4.5.x
Terra HP	1.5.x
Terra HVC (Depot box and OppCharge)	1.5.x
Terra DC Wallbox	1.5.x
Terra 94/124/184	1.7.x
Terra 365/185/65	1.7.x

3. ABB status notification vendorErrorCodes

vendorErrorCode	Description	Customer Action
StopReason: Invalid	Reason for stopping cannot be identified.	None
StopReason: NoError	No error occurred, similar to a normal stop.	None
StopReason: UserRequestedStop	User pressed the stop button on HMI. This stop reason is also used in HVC depot boxes, when the stop was due to the sequential charging controller.	None
StopReason: ConnectorButtonPressed	CCS1 connector button is pressed by user. Proximity pilot (PP) voltage is higher than a threshold.	None
StopReason: VehicleStop	The vehicle requested to stop the session by a driver request or internal trigger in the controller of the vehicle. This is not a stop of a session due to some error on vehicle side, e.g. communication protocol violation, but a stop according to standard.	None
StopReason: IncompatibleVehcile	This vehicle cannot be charged on this outlet. It does not meet the required charging parameters supported by this charger. Typical case: CHAdeMO in Japan is limited to 450V, so if a car from outside Japan with a target of 500V is connected, it is incompatible.	Check car specification.
StopReason: IsolationTestFailed	Most common cause: Isolation resistance is too low. In the case of pantograph this can be caused by weather circumstances, or the isolation measurement is disturbed, or the y capacity is too high to be able to do a proper measurement. If only one vehicle fails on this outlet and other vehicles can charge, most likely this is a vehicle problem. If the outlet cannot charge at all, the	Try different vehicle. If no vehicle can charge, contact ABB Service.

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	problem is likely in the IMI measurement system or noise on the grid.	
StopReason: CableCheckFailed	Isolation failure during cable check phase.	Contact ABB Service.
StopReason: BatteryFull	Stopped because vehicle battery is full. Almost not used as vehicle would stop charging according to standard (VehicleStop).	None
StopReason: BudgetExceeded	Stopped because the vehicle asked for or tried to draw too much power.	Check vehicle behavior.
StopReason: EmergencyStop	Charger emergency button is pressed by user.	Release emergency button.
StopReason: ChargerError	Charging Protocol Interface (CPI) board error. The charger didn't work as expected. Probably a boxcheck failed.	Check charger detailed status (Box Checks in ABB Web tools). Contact ABB Service.
StopReason: ChargerContactorsProblem	There are 4 DC kilovac relay contactors in the charger. If any of the kilovac relays is not closing/opening this error will appear. On Terra xx4 (T184) chargers, this indicates a problem with the interlink DC contactor.	Contact ABB Service.
StopReason: ChargerLoweringCurrentTimeout	This happens when, near to full charge, the vehicle requests reduction of current. If the charger does not follow the request within specified timeout of 400 ms vehicle will stop the session.	If happens frequently, contact ABB Service.
StopReason: ConnectorError	Proximity Pilot voltage < 0.7V. Supply of the ACS (panto-down) was not giving the right feedback (this should not occur anymore).	Contact ABB Service.
StopReason: ConnectorPilotError	1. In case of Staubli connector being used, please check Staubli wiring at the charger terminal block. 2. Check wiring, connections at the CPI board side. 3. If everything looks ok advice is to replace the CPI board.	Contact ABB Service.
StopReason: ConnectorPilotShortCircuit	Control pilot is in short-circuit (0V/State E). It can be caused by bad wiring.	Contact ABB Service. Check wiring.

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StopReason:ConnectorTemperatureError	The connector (cable end going into the vehicle) is too hot. Also can happen due to a wrong measurement of a faulty PT1000 temperature sensor. The threshold is 90 degrees Celsius. It indicates issues with cooling system.	Try with different vehicle. If this issue occurs repeatedly please contact ABB Service.
StopReason: OutletError	This could be a problem of the: 1. CPI/IMI assembly. 2. CCB (if this can't provide enough power to the CPI board). 3. CAN cable between CCB and CPI.	Contact ABB Service.
StopReason: ChargerPreChargeTimeout	Precharge timeout is reached. Precharge must only be used for a limited time, which in total currently is 67 seconds. In the future, this may change to 30 seconds. (This timeout actually runs in the vehicle).	Check behavior of vehicle.
StopReason: ChargerVoltageDrop	Measured voltage is lower than the expected. This is referred to the actual voltage measured from the charging cable. On T184 (Nov 2020) this could indicate wrong wiring (e.g: DC- group1 to K2- and DC- group2 to K1-).	Contact ABB Service.
StopReason: ChargerMaxVoltage	Maximum voltage exceeded. Can be caused by opening of contactors of the vehicle. Can be caused by losing a DC contact on the pantograph.	Check in vehicle contactors opened or pantograph lost contact.
StopReason: ChargerStopTimout	Vehicle takes too long to send the stop command.	Check vehicle behavior.
StopReason: ChargerConnectorPresenceLost	Charger was not able to pick the CP (control pilot) state changes from the vehicle, so charger thinks that no vehicle is connected. Or the CP line is lost during a charge session, due to disconnection of the outlet (without lock). In case this happens with several vehicles, advised to check the CP line, which goes from connector J12 1st and 6st pin, to the cable terminal, and then to the connector. Also happens when control pilot > 10.5V. ACS: During charge the pantograph loses contact. Can be caused by 'dirty contacts'. Kneeling outside of the operation area of the pantograph.	Check if pantograph lost contact, e.g. due to dirt or vehicle parking position.
StopReason: ChargerErrorCurrentDifference	The charger detected that the current difference is too large. Occurs in the case the vehicle is close to controlled voltage charging. A lot at shutdown scenario, declared after powerDelivery. This error happens more in CV mode (controlled	Better use controlled current (CC) instead if controlled voltage (CV).

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	voltage), so better use CC (controlled current). Also can happen during ramp up of UUGreen power modules when large current steps are used.	
StopReason: ChargerCanCommunication Lost	The power cabinet internal CAN bus communication is lost. If this repeats please contact ABB Service.	Contact ABB Service.
StopReason: ChargerMcbTripped	Charger circuit breaker tripped.	Check if circuit breaker tripped.
StopReason: ChargerRcdTripped	The AC input (from the grid) Residual Current Device (RCD) tripped.	Check if RCD tripped.
StopReason: ChargerRcdCloseError	RCD closing error. Applies when charger allows RCD trips during charge session.	Check if RCD tripped.
StopReason: ChargerTemperatureError	The temperature of the power cabinet or charger (in case of all-in-one installation) is high, likely due to the fan in the power cabinet not running.	Check if fan in the cabinet is working.
StopReason: ChargerNeutralMismatch	Charger neutral mismatch.	Check wiring, contact ABB Service.
StopReason: ChargerOutletDetection	This could be a problem of the: 1. CPI/IMI assembly. 2. CCB (if this can't provide enough power to the CPI board). 3. CAN cable between CCB and CPI. This is related to configuration parameters of the CPI and other due to failure in the board.	Contact ABB Service.
StopReason: VehicleProrocolError	From software 1.5.1 (Terra 53/54 from 4.5.1) onwards, this is replaced by more detailed StopReason:Est... . This stop reason is an umbrella stop reason. From the charger's perspective the vehicle has violated charging protocol specifications. This could be an interoperability problem. Examples: • No SLAC communication started. • Sudden C to B change during power delivery, followed by ReadyToChargeState{0} from vehicle. • Vehicle does not respond to Wake up (B1 -> B2).	Check vehicle behavior. Update software to get the more detailed error.

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StopReason: PowerPortVipError	The powerport vip (voltage, current, power) value is showing zero. For example: The voltage reflect as zero due to the MCB of the respective power module is not switch on.	Check in power modules are working.
StopReason: PowerportPowerError	Power module does not respond fast enough. This can happen when the vehicle requests >>10 times a 0 to X ampere transition. Or other power module related control issues. All Power Modules are disabled - No charging allowed. Most likely there is an error with the power modules and need to be replaced. If this occurs too often, then further troubleshooting.	If happens frequently, change power module.
StopReason: PowerPortFanFailure	All power modules affected by a fan failure. Check if the Power Module fan is receiving input power (230V/AC).	Check if the power module fan is receiving input power (230V/AC).
StopReason: PowerPortOverheat	All power modules show a high temperature due to the fan not running.	Check if the power module fan is working.
StopReason: PowerPortInterlock	Interlock of power modules active.	Contact ABB Service.
StopReason: PowerPortErrorOther	Umbrella error for any other power modules related errors. If repeats please contact ABB service	Contact ABB Service.
StopReason: VehcileErrorReversePolarity	The polarity of the vehicle is reversed.	Check polarity of vehicle.
StopReason: VehicleErrorVoltageApplied	There is a (dangerous) voltage applied to the DC output when this is not expected. When establishing a new charge session if the charger detects a higher than 60 volts at the vehicle inlet it aborts charge session since this would not be safe as per the standard.	Contact ABB Service.
StopReason: LockError	Unable to lock the connector, no dangerous voltage present.	Check if connector can lock.
StopReason: UnlockError	Unable to unlock the connector, no dangerous voltage present.	Check if connector can unlock.
StopReason: LockTampering	Tampering with the connector lock detected.	Check if connector locks

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StopReason: CableError	Charger cannot detect charging cable type e.g. after cable replacement. Please check if cable installed properly.	Contact ABB Service.
StopReason: GlobalInterlockFail	Global Interlock activated. Can be related to: RCD tripped, Emergency Button pressed, One of the Doors open, CCB Board issue, disconnected connector while there is still high voltage on the outlet.	Check RCD, emergency button, close door.
StopReason: VehicleShiftPosition	Vehicle shift position indicator is incorrect or vehicle is in drive mode.	Put vehicle is parking mode.
StopReason: VehcileBatteryTemperatureOutOfRange	Vehicle communicated that its battery temperature is out of range.	Check vehicle.
StopReason: VehicleLockError	Vehicle is unable to lock the connector.	Check if connector locks.
StopReason: VehicleBatteryMalfunction	Vehicle communicated its battery malfunction.	Check vehicle.
StopReason: VehcileCurrentDifference	Vehicle detected current is not within specs.	Try different vehicle, check vehicle behavior.
StopReason: VehcileVoltageOutOfRange	Vehicle detected voltage is out of range.	Try different vehicle, check vehicle behavior.
StopReason: VehicleError	General vehicle error. The vehicle did an unexpected behavior according to the standards of charging, like change the state unexpectedly, did not reply a message with the expected way in the standards.	Check vehicle behavior.
StopReason: BoardPowerSupplyError	Charger auxiliary power supply (24V) has issues.	Check 24V power supply.
StopReason: OcmNotAlive	Over current monitor not alive.	Contact ABB Service.
StopReason: OcmInterlockVerificationError	Interlock by over current monitor is not functioning properly.	Contact ABB Service.
StopReason: OcmCableRatingMismatch	Over current monitor and cable rating does not match.	Contact ABB Service.

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StopReason: OnboardEnergymeterError	Vehicle onboard energy meter error.	Contact ABB Service.
StopReason: VehicleWeldingDetectionTimeout	Vehicle contactor welding detection request took too long. This timeout depends on the vehicle.	Try different vehicle.
StopReason: CableCheckCurrentRunning	The isolation test failed during this session. Most likely one of the power modules is defective and needs to be replaced. You might need to test each power modules individually to find which one is causing the fault. It could also be that DC power path has high resistance (long cable, increase resistance in connector). Power module testing is done by ABB.	Contact ABB Service to check power modules.
StopReason: CableCheckVoltageTooLow	Power module that was selected for the cable check is not functioning or AC relay is malfunctioning. During cable isolation test, the voltage measured by the outlet is too low. Main reason could be that power modules are not switching on, or not receiving enough input power. Check if power module MCB tripped.	Contact ABB Service to check power modules.
StopReason: CableCheckVoltageTooHigh	The session has failed because the power module (PM) voltages were too high during the "cable check" (isolation test) stage of the charge session. This can be caused by the PM receiving too much power from the grid. A defective PM can also cause this issue.	Check grid voltage and power module.
StopReason: CableCheckVoltageNotDropping	Voltage is not dropping when expected during the cable check. Reason can be a broken CPI.	Contact ABB Service.
StopReason: ChargerTimeCompleted	Stopped because car has been charging long enough. The time configured for the max charge time parameters in the charger setting page in ABB Web tool passed. The charger must stop the session as per configuration.	None
StopReason: VehicleNotConnected	No state 'B' was detected. The connection between the charger and the vehicle is interrupted. This happens e.g. if a remote start is send (via OCPP from an user app) without a vehicle being connected. It happens more with Chademo as it is difficult to detect if a car is connected.	Make sure the vehicle is connected. Try different vehicle.
StopReason: SoftError	Software induced error, typically when the watchdog found that one of the software components (Lithos) is not running. This also can happen once after startup when Lithos is not up and running yet.	None

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StopReason: StoppedByVehicle	Stopped by vehicle. Used on AC outlet only, typically by Renault Zoe.	None
StopReason: AcsErrorExtending	Problem happened that prevent the pantograph (panto-down) from extending.	Check extending of pantograph.
StopReason: AcsErrorRetracting	Pantograph (panto-down) error retracting.	Check retracting of pantograph.
StopReason: AcsExtendedTimeout	Extending the pantograph (panto-down) takes too long, can be caused by a malfunctioning pantograph motor or lowering arm.	Check extending of pantograph.
StopReason: AcsRetractedTimeout	Retracting the pantograph (panto-down) takes too long, can be caused by a malfunctioning pantograph motor or lowering arm. This happens after 30 seconds (could be extended to 60 seconds in the future). The stop reason is normally not visible, as the StopReason:VehicleStop already closed the session, and the retracting only happens after that.	Check retracting of pantograph.
StopReason: AcsErrorAlignment	No complete charging circuit when the pantograph is lowered (panto-down). Normally caused by misalignment of the vehicle. Other cause can be dirty contact or malfunctioning extended sensor.	Check if pantograph lost contact, e.g. due to dirt or vehicle parking position.
StopReason: ChargerCabinetOvp	The Over Voltage Protection in cabinet is tripped, no charging possible.	Check over voltage protection.
StopReason: ChargerCableCoolerFailure	Cable cooler (chiller) is not reachable, or gives an error, or the cable type is configured wrongly and expects a cooler while there is none.	Check if right cooler(chiller) is configured.
StopReason: ChargerCableCoolerTemperature	Temperature of cooler out of range. If the temperature is below -20 Celsius, charging is not possible to protect the cable.	Try with warmer ambient temperature.
StopReason: ChargerCableTemperature	The cable is too hot at the charger end, charging possible after cool-down. Also can happen due to a wrong measurement of a faulty PT1000 temperature sensor. Can also happen due to an wrong hardware configuration.	Wait for cable cooling down.
StopReason: ChargerContactorTemperature	Contactor (in the charger) temperature is out-of-range, charging possible after cool-down.	Wait for cable cooling down.

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StopReason:Est....	A vehicle protocol error for DIN or ISO protocols occurred. For a first analysis, the details of the state in which session stopped are encoded in the message. For charge protocol experts, this gives an estimation (Est) of the cause of the issue. The format is Est{Start|Nostrart}{A|B1|B2|C|D|E|F\}Different-states-and-errors. Start/Nostart indicates if session has started A|B|… indicates session state in which session was stopped. DifferentStateAndErrors – detailed description of error Example: EstStart_CblChkSt_B2_PchargeErr EstUndef indicates that no further hint can be given. There is a separate documentation available about how to interpret these Est… stop reasons. It requires to be familiar with the charge protocols.	Check vehicle behavior.
StopReason:EstCorrect	Normal stop.	None
StopReason:Blocked	ID tag for OCPP authorization is blocked on server.	Use valid ID tag.
StopReason:Expired	ID tag for OCPP authorization is expired on server.	Use valid ID tag.
StopReason: InvalidOnServer	ID tag is marked as Invalid by the OCPP server. This also happens if Autocharge is turned on on the charger, but not used on the OCPP server and therefore rejected. Before sw 1.5. Autocharge was used to communicate VID. Communicated Autocharge IDs in OCPP start with "VID:", RFID without.	Check if ID tag is valid, try different ID tag. Switch off Autocharge.
StopReason: InvalidOnCharger	ID tag is marked as Invalid by the charger software (e.g. by local authorization).	Check if ID tag is valid, try different ID tag.
StopReason: RequestRejected	Charger software rejects request for authorization in scenarios where it is not applicable.	Check if ID tag is valid, try different ID tag.
StopReason: WrongMessage	Wrong parameters provided for the Authorization request or in the Authorization response messages.	Check communication with service for standard compliance.
StopReason: NoMatchingIDs	ID tags for OCPP Start and Stop do not match.	Use same ID tag to start and stop the session.

StopReason: ServerUnreachable	The authorization failed as the server could not be reached (timeout for reaching server is 40 seconds).	Check if server is reachable.
StopReason: NoCardPresented	The authorization failed because the user did not present a card.	Ask user to present a card at the right position
StopReason: AuthorizedStop	Authorization was used to stop charging where authorization is required for stop.	None
StopReason: ForcedStop	Used when it is required to stop the charging without an authorization. For example, in the `UnlockConnector` situation.	None
StopReason: NormalStop	Normal stop that does not fall into any of other categories.	None
StopReason: VehicleNotConnected	There is no vehicle connected.	Connect vehicle.
StopReason: ImiDisconnectedFromDcbus	From IMI board 1.6: CPI and IMI measure different voltages. Possible reason: CPI disconnected from DC bus and therefore measures 0 Volt. Using hardware IMI 1.6 with software <1.7 also can cause this.	Contact ABB Service.
StopReason: *[no further text]* or StopReason:None	This happens e.g. when user plugs in and plugs out after a while without any further action. Session start and stop time shows the plug in and plug out events. This is a justified empty session, with no authorization and no energy. In software versions before 1.7 this also could happen in error.	Ask user to act like indicated on the screen. Check session in EVE. Contact ABB Service.

4. Reference documentation

[1] Open Charge Point Protocol 1.6, edition 2 FINAL, 2017-09-28