[V2G2-422] The EVCC shall request ServiceDetails prior using one or multiple services offered in the ServiceList of the ServiceDiscoveryRes.

[V2G2-424] The EVCC shall provide the ServiceID for which the service details are requested. The ServiceID shall be used according to Table 105.

[V2G2-425] The SECC shall respond with a negative ResponseCode 'FAILED_ServiceIDInvalid' if the EVCC provided a not previously retrieved ServiceID in the ServiceDetailsReq.

[V2G2-426] The SECC shall respond with the ServiceParameterList containing the detailed information about the requested ServiceID.

[V2G2-427] The ServiceParameterList shall contain a ParameterSetID and details to the offered parameters.

[V2G2-428] The ServiceParameterList shall comply with Table 106 if service details for ServiceID 2 'Certificate' is requested

Table 106 — ServiceParameterList for certificate service

ParameterSetID (unsignedshort)	ParameterName = Service	Description
0		Reserved by ISO/IEC
1	stringValue = Installation	Service to install a Contract Certificate in the EVCC, according to 8.4.3.11.
2	stringValue = Update	Service to update a Contract Certificate in the EVCC, according to 8.4.3.10.
4 – 60000		Reserved by ISO/IEC
60001 – 65535		Implementation specific use

[V2G2-429] The ServiceParameterList shall comply with Table 107 if service details for ServiceID 3 'InternetAccess' is requested.

Table 107 — ServiceParameterList for internet access service

ParameterSetID (unsignedshort)	ParameterName = Protocol	ParameterName = Port	Description
0			Reserved by ISO/IEC
1	stringValue = ftp	intValue = 20	Service to use internet access using FTP protocol via port 20
2	stringValue = ftp	intValue = 21	Service to use internet access using FTP protocol via port 21
3	stringValue = http	intValue = 80	Service to use internet access using HTTP protocol via port 80
4	stringValue = https	intValue = 443	Service to use internet access using HTTPS protocol via port 443,
5 – 65535	service name according to IANA Service&PortRegistry	port number according to IANA Service&PortRegistry	Additional protocol port combinations which are supported by the SECC for internet access

[V2G2-430] If the SECC supports additional protocol / port combinations beyond the definitions in Table 107, it shall use the service names and the assigned port numbers according to IANA Service&PortRegistry (i.e. the service name defined in IANA Service&PortRegistry is transmitted as the "Protocol" and the port number defined in IANA Service&PortRegistry is transmitted as "Port").

NOTE 2 It is assumed if a IANA Service&PortRegistry defined service name and port number combination is applicable for both transport protocols, TCP and UDP, the SECC supports connections on TCP or UDP or on both for the respective combination.

[V2G2-431] The PaymentServiceSelectionReq shall contain a list of selected services.

[V2G2-432] Each selected service shall be defined according to a ServiceID and a ParameterSetID which are previously retrieved from the SECC using ServiceDiscovery and ServiceDetail Message Set.

[V2G2-433] The SECC shall respond with a negative ResponseCode 'FAILED_ServiceSelectionInvalid' if the EVCC provided a not previously retrieved ServiceID, ParameterSetID pair in the PaymentServiceSelectionReq.

[V2G2-774] If the EVCC and the SECC agreed on the usage of VAS "Internet Access" (Service ID 3, AuthorizationRes with ResponseCode = OK & EVSEProcessing = Finished) the SECC shall provide the VAS for the entire charging session.

8.7 V2G communication timing

8.7.1 Overview

This subclause describes the timing and error handling for the V2G Communication Session. The error handling is based on timers enabling the EVCC and the SECC to monitor the V2G message exchange. For the detection of missing or delayed messages the EVCC and the SECC use predefined timeout values as error criteria. Whenever a timer is equal of larger than the related timeout the related error handling is processed.

A timer counts the duration from the last time it was reset and then started. The value of a timer is the duration from its most recent reset and start time to the present time. The monitoring of a V2G communication message exchange is based on two Timer categories:

— Message Timer: Monitors the exchange of a request message and the corresponding response message (Request-Response-Pair).

— Sequence Timer: Monitors the exchange of multiple Request-Response-Pairs.

To enable error handling for a V2G Communication Session setup the EVCC monitors the time between plug-in and the reception of the SessionSetupRes and the PowerDeliveryRes, respectively. This allows the EVCC to decide about a successful or failed charging session after the defined timeouts.

The monitoring of a V2G Communication Session is based on the following timing concepts:

— Message timing: Monitors the timing between the request and the response of a Request-Response-Pair. This allows e.g. the EVCC application to initiate the error handling if no response is sent.

— Sequence timing: Monitors the timing of subsequent Request-Response-Pairs. This allows e.g. the SECC application to initiate the error handling if an expected next request message was not sent.

— Ongoing timing: Monitors the timing in case of sending a Request-Response-Pair repeatingly based on the parameter EVSEProcessing equal to "Ongoing". This allows an e.g. the EVCC to initiate the error handling in case the SECC exceeds the processing time.

— Communication Setup timing: Monitors the time from the moment of an established data link until the Session Setup message. It allows deciding if the communication setup was successful within a defined time.

— CableCheck timing: The monitoring of the Cable Check is carried out by the EV using the V2G_EVCC_CableCheck_Timer. It is started when the EV requests the EVSE to start the Cable Check, and ends when the EVSE has finished the Cable Check, or when the V2G_EVCC_CableCheck_Timer expires.

— PreCharge timing: The monitoring of the Pre Charge is carried out by the EV using the V2G_EVCC_PreCharge_Timer. It is started when the EV starts the Pre Charging by sending the first PreChargeReq message, and ends when the Pre Charging has finished, indicated by the EV determining that the EVSE output voltage, as measured inside the EV, has sufficiently been adjusted to the EV RESS voltage, or when the V2G_EVCC_PreCharge_Timer expires.

The timers are compared to predefined time values as decision criterion. The EVCC and the SECC distinguish between two categories:

— Timeout: If the specified time is exceeded the related error handling is initiated.

— Performance Time: If the specified time is exceeded the performance requirement is not fulfilled.

NOTE While exceeding a timeout always causes an error handling, the performance time does not necessarily cause error handling if not defined differently by requirements. Depending on the system behaviour (e.g. transmission time) no error may occur if the corresponding communication partner does not detect a timeout but the probability for causing a timeout is high.

8.7.2 Message sequence and communication session

8.7.2.1 Definitions

Message Timers, Sequence Timers, Timeouts, and Performance Times are defined for EVCC and SECC separately and are summarized in Table 108. Timeouts and Performance Times are parameterized for messages separately to describe different processing times. Table 109 defines the values for each V2G message type.

Table 108 — EVCC and SECC Timers, Timeouts, Performance Times

Name	Type	Applicable for	
		EVCC	SECC
V2G_EVCC_Msg_Timer	Message Timer in the EVCC	x	
V2G_SECC_Msg_Timer	Message Timer in the SECC		x
V2G_EVCC_Sequence_Timer	Sequence Timer in the EVCC	x	
V2G_SECC_Sequence_Timer	Sequence Timer in the SECC		x
V2G_EVCC_Ongoing_Timer	Ongoing Timer in the EVCC	x	
V2G_SECC_Ongoing_Timer	Ongoing Timer in the SECC		x
V2G_EVCC_Msg_Timeout (MessageType)	Timeout for the Message Timer The value is defined depending on the parameter MessageType as defined in Table 109.	x	
V2G_SECC_Msg_Performance_Time (MessageType)	Performance Time for the Message Timer The value is defined depending on the parameter MessageType as defined in Table 109.		x
V2G_EVCC_Sequence_Performance_Time	Performance Time for the Sequence Timer as defined in Table 109.	x	

V2G_SECC_Sequence_Timeout	Timeout for the Sequence Timer as defined in Table 109.		x
V2G_EVCC_Ongoing_Timeout	Timeout for Ongoing Timer	x	
V2G_SECC_Ongoing_Performance_Time	Performance Time for Ongoing Timer		x

Table 109 — EVCC and SECC Message sequence and session timing parameter values

Name	MessageType	Value [s]
V2G_EVCC_Msg_Timeout(MessageType)	SupportedAppProtocolReq	2
	SessionSetupReq	2
	ServiceDiscoveryReq	2
	ServiceDetailReq	5
	PaymentServiceSelectionReq	2
	PaymentDetailsReq	5
	AuthorizationReq	2
	ChargeParameterDiscoveryReq	2
	ChargingStatusReq	2
	MeteringReceiptReq	2
	PowerDeliveryReq	5
	CableCheckReq	2
	PreChargeReq	2
	CurrentDemandReq	0,25
	WeldingDetectionReq	2
	SessionStopReq	2
	CertificateInstallationReq	5
	CertificateUpdateReq	5

Name	MessageType	Value [s]
V2G_SECC_Msg_Performance_Time(MessageType)	SupportedAppProtocolRes	1,5
	SessionSetupRes	1,5
	ServiceDiscoveryRes	1,5
	ServiceDetailRes	4,5
	PaymentServiceSelectionRes	1,5
	PaymentDetailsRes	4,5
	AuthorizationRes	1,5
	ChargeParameterDiscoveryRes	1,5
	ChargingStatusRes	1,5
	MeteringReceiptRes	1,5
	PowerDeliveryRes	4,5
	CableCheckRes	1,5
	PreChargeRes	1,5
	CurrentDemandRes	0,025
	WeldingDetectionRes	1,5
	SessionStopRes	1,5
	CertificateInstallationRes	4,5
	CertificateUpdateRes	4,5
V2G_EVCC_Sequence_Performance_Time	(all messages)	40
V2G_SECC_Sequence_Timeout	(all messages)	60
V2G_EVCC_Ongoing_Timeout	Response messages with parameter EVSEProcessing equal to 'Ongoing'	60
V2G_SECC_Ongoing_Performance_Time	Response messages with parameter EVSEProcessing equal to 'Ongoing'	55

Figure 98 illustrates how the Message Timers, Sequence Timers, Timeouts, and Performance Times are applied in the EVCC and the SECC.

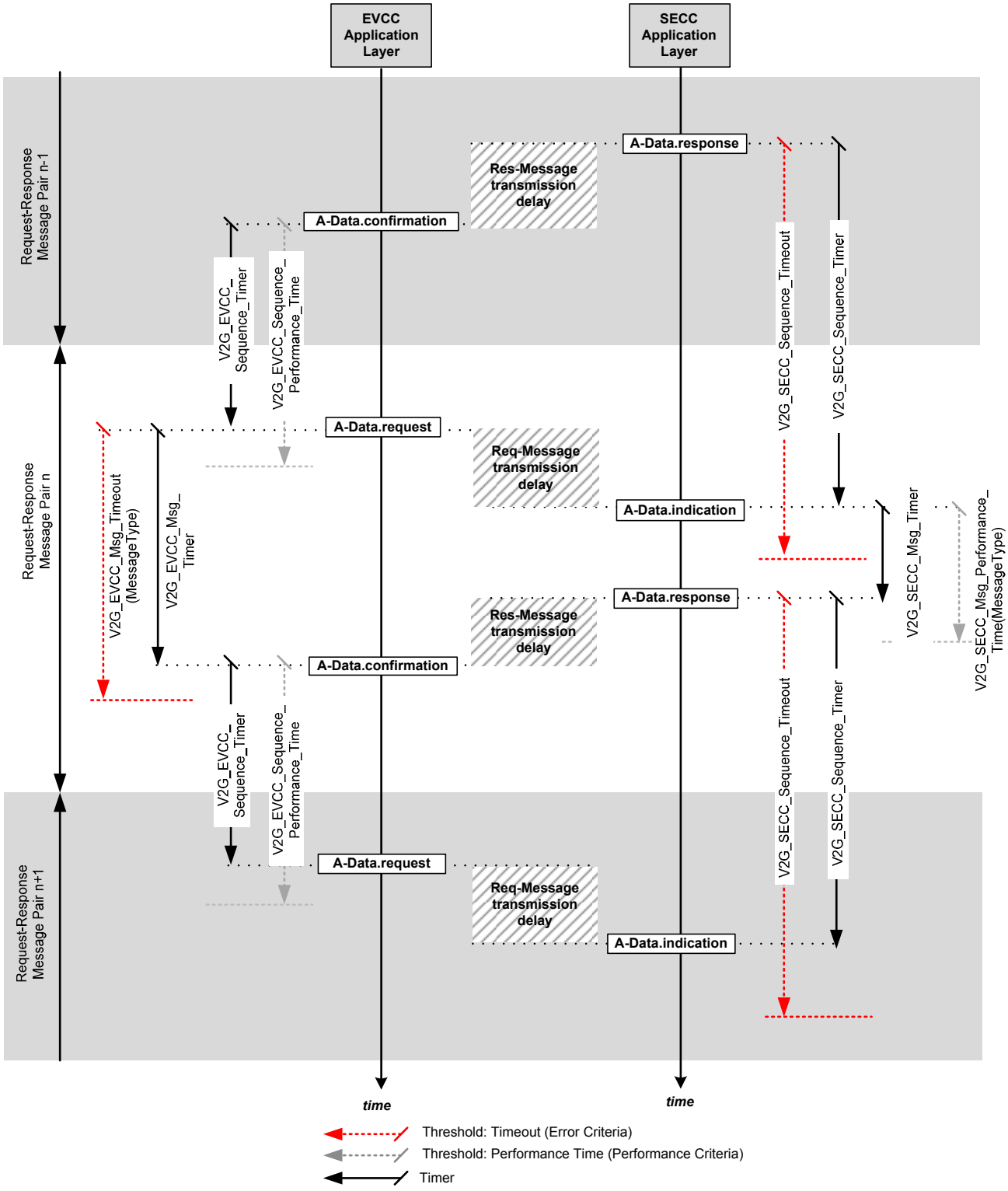

Figure 98 — Message sequence and session timing

[V2G2-434] The EVCC shall implement the EVCC specific Timeouts and Performance Times defined in Table 108 and Table 109.

[V2G2-435] The SECC shall implement the SECC specific Timeouts and Performance Times defend in Table 108 and Table 109.

8.7.2.2 EVCC Timing for Request-Response Message Pairs

[V2G2-436] The EVCC shall set the timeout V2G_EVCC_Msg_Timeout depending on the value MessageType as defined in Table 109, reset the V2G_EVCC_Msg_Timer and start monitoring the V2G_EVCC_Msg_Timer when it sends a request message.

NOTE 1 In this document sending a request message is described by A-Data.request.

[V2G2-437] The EVCC shall wait for the response message corresponding to the request message sent before.

[V2G2-438] The EVCC shall stop waiting for the response message and stop monitoring the V2G_EVCC_Msg_Timer when V2G_EVCC_Msg_Timer is equal or larger than V2G_EVCC_Msg_Timeout(MessageType) and no response message was received. It shall then apply the error handling as defined in subclause 8.8.

NOTE 2 In this document receiving a response message is described by A-DATA.confirmation.

[V2G2-439] The EVCC shall stop waiting for the response message and stop monitoring the V2G_EVCC_Msg_Timer when V2G_EVCC_Msg_Timer is smaller than V2G_EVCC_Msg_Timeout(MessageType) and it received a response message. It shall then process the response message as defined in subclause 8.8.

NOTE 3 In this document receiving a response message is described by A-Data.confirmation.

[V2G2-440] The EVCC shall ignore any message that is not a valid response message.

8.7.2.3 SECC Timing for Response-Request Message Sequence

[V2G2-441] The SECC shall set the timeout V2G_SECC_Sequence_Timeout to the value as defined in Table 109, reset the V2G_SECC_Sequence_Timer and start monitoring the V2G_SECC_Sequence_Timer when it sends a response message.

NOTE 1 In this document sending a response message is described by A-Data.response.

[V2G2-442] The SECC shall wait for a request message.

[V2G2-443] The SECC shall stop waiting for a request message and stop monitoring the V2G_SECC_Sequence_Timer when V2G_SECC_Sequence_Timer is equal or larger than V2G_SECC_Sequence_Timeout and no request message was received. It shall then stop the V2G Communication Session..

NOTE 2 In this document receiving a request message is described by A-Data.indication. A-Data.indication (A_Msg="message name") signalizes the successful reception of a valid request message for the V2G message that is given by A_Msg where "Valid message" means that all mandatory elements are filled in so that it can be deserialized.

[V2G2-444] The SECC shall stop waiting for a request message and stop monitoring the V2G_SECC_Sequence_Timer when V2G_SECC_Sequence_Timer is smaller than V2G_SECC_Sequence_Timeout and it received a request message. It shall then process the response message as defined in subclause 8.8.

NOTE 3 In this document receiving a request message is described by A-Data.indication.

[V2G2-445] The SECC shall ignore any message that is not a valid request message.

8.7.3 Session setup and ready to charge

8.7.3.1 Definitions

Timing parameters applicable to the communication session setup and ready to charge time defined in this standard are shown in Table 110. Table 111 define the values for the related performance times and the Timeouts.

Table 110 — EVCC and SECC V2G Communication Session setup timing parameters

Parameter name	Definition	Implementation	
		EVCC	SECC
V2G_EVCC_CommunicationSetup_Timer	Communication Setup Timer in the EVCC	x	
V2G_SECC_CommunicationSetup_Timer	Communication Setup Timer in the SVCC		x
V2G_EVCC_CableCheck_Timer	Cable Check Timer in the EVCC	x	
V2G_SECC_CableCheck_Timer	Cable Check Timer in the SECC		x
V2G_EVCC_PreCharge_Timer	PreCharge Timer in the EVCC	x	
V2G_SECC_PreCharge_Timer	PreCharge Timer in the SECC		x
V2G_EVCC_CommunicationSetup_Timeout	Timeout for the Communication Setup Timer as defined in Table 111.	x	
V2G_SECC_CommunicationSetup_Performance_Time	Performance Time for the Communication Setup Timer as defined in Table 111.		x
V2G_EVCC_CableCheck_Timeout	Timeout for the CableCheck Timer as defined in Table 111.	x	
V2G_SECC_CableCheck_Performance_Time	Performance Time for the CableCheck Timer as defined in Table 111.		x
V2G_EVCC_PreCharge_Timeout	Timeout for the PreCharge Timer as defined in Table 111.	x	
V2G_SECC_ PreCharge_Performance_Time	Performance Time for the PreCharge Timer as defined in Table 111.		x

[V2G2-605] The EVCC and SECC shall implement the timing parameter values defined in Table 111.

Table 111 — EVCC and SECC Message sequence and session timing parameter values

Parameter name	Value [s]	Implementation	
		EVCC	SECC
V2G_SECC_CommunicationSetup_Performance_Time	18		x
V2G_EVCC_CommunicationSetup_Timeout	20	x	
V2G_SECC_CableCheck_Performance_Time	38		x
V2G_EVCC_CableCheck_Timeout	40	x	
V2G_SECC_PreCharge_Performance_Time	5		x
V2G_EVCC_PreCharge_Timeout	7	x	

Figure 99 illustrates how the timing parameters defined in Table 110 are applied.

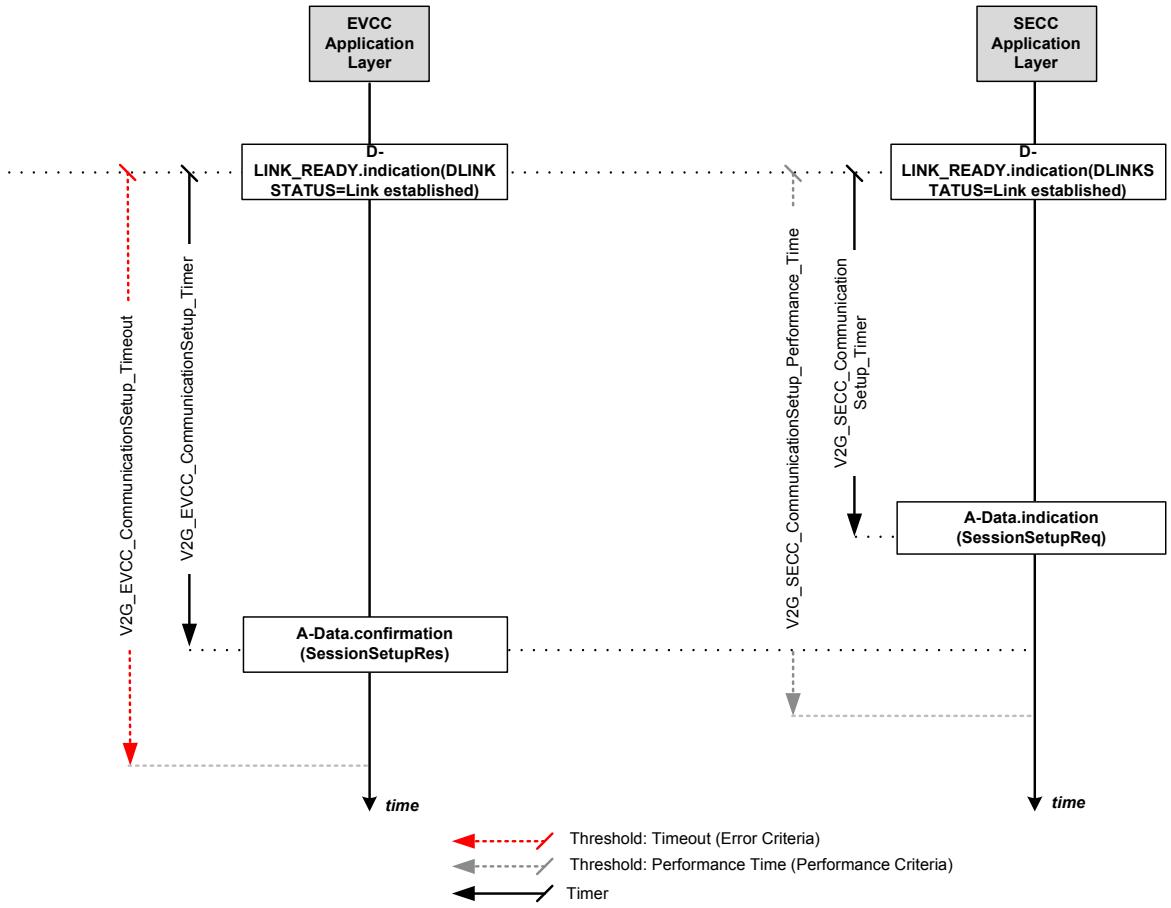

Figure 99 — CommunicationSetup timing

8.7.3.2 EVCC Timing for communication session setup

[V2G2-446] The EVCC shall set the timeout V2G_EVCC_CommunicationSetup_Timeout to the value as defined in Table 111, reset the V2G_EVCC_CommunicationSetup_Timer and start monitoring the V2G_EVCC_CommunicationSetup_Timer when a successful Data-Link establishment is indicated (D-LINK_READY.indication(DLINKSTATUS=Link established)).

[V2G2-447] The EVCC shall wait for the SessionSetupRes message.

[V2G2-448] The EVCC shall stop waiting for the SessionSetupRes message and stop monitoring the V2G_EVCC_CommunicationSetup_Timer when V2G_EVCC_CommunicationSetup_Timer is equal or larger than V2G_EVCC_CommunicationSetup_Timeout and no SessionSetupRes message was received. It shall then stop the V2G Communication Session.

NOTE 1 In this document receiving the response message “SessionSetupRes” is described by A-Data.confirmation(SessionSetupRes).

[V2G2-449] The EVCC shall stop waiting for the SessionSetupRes message and stop monitoring the V2G_EVCC_CommunicationSetup_Timer when V2G_EVCC_CommunicationSetup_Timer is smaller than V2G_EVCC_CommunicationSetup_Timeout and a SessionSetupRes message was received. It shall then process the response message as defined in subclause 8.8.

NOTE 2 In this document receiving the response message “SessionSetupRes” is described by A-Data.confirmation(SessionSetupRes).

8.7.3.3 SECC Timing for communication session setup

[V2G2-714] The SECC shall set the timeout V2G_SECC_CommunicationSetup_Performance_Time to the value as defined in Table 110, reset the V2G_SECC_CommunicationSetup_Timer and start monitoring the V2G_SECC_CommunicationSetup_Timer when a successful Data-Link establishment is indicated (D-LINK_READY.indication(DLINKSTATUS=Link established).

[V2G2-715] The SECC shall wait for the SessionSetupReq message.

[V2G2-716] The SECC shall stop waiting for SessionSetupReq and stop monitoring the V2G_SECC_CommunicationSetup_Timer when V2G_SECC_CommunicationSetup_Timer is equal or larger than V2G_SECC_CommunicationSetup_Performance_Time and no SessionSetupRes message was sent. It shall then apply [V2G2-034].

NOTE 1 In this document sending the response message “SessionSetupRes” is described by A-Data.response(SessionSetupRes).

8.7.3.4 EVCC Timing for EVSEProcessing parameter

[V2G2-710] If the EVCC receives a V2G response message with parameter EVSEProcessing equal to 'Ongoing' for the first time in a response message it shall start the timer V2G_EVCC_Ongoing_Timer and wait for parameter EVSEProcessing equal to 'Finished'.

[V2G2-711] If **[V2G2-710]** applies, the EVCC shall stop the V2G Communication Session when V2G_EVCC_Ongoing_Timer is equal or larger than V2G_EVCC_Ongoing_Timeout and no parameter EVSEProcessing equal to 'Finished' has been received.

8.7.3.5 SECC Timing for EVSEProcessing parameter

[V2G2-712] If the SECC sends a V2G response message with parameter EVSEProcessing equal to 'Ongoing' for the first time in a response message it shall start the timer V2G_SECC_Ongoing_Timer.

[V2G2-713] If **[V2G2-712]** applies, the SECC shall try to send ResponseCode equal to "FAILED" when V2G_SECC_Ongoing_Timer is equal or larger than V2G_SECC_Ongoing_Performance_Time and no parameter EVSEProcessing equal to 'Finished' has been sent. The SECC shall stop the V2G Communication Session.

8.7.3.6 EVCC Timing for cable check

[V2G2-700] The EVCC shall set the timeout V2G_EVCC_CableCheck_Timeout to the value as defined in Table 111, reset the V2G_EVCC_CableCheck_Timer and start monitoring the V2G_EVCC_CableCheck_Timer when sending the message CableCheckReq for the first time in a charging session.

NOTE 1 In this document, sending a request message is described by A-Data.request.

[V2G2-701] The EVCC shall wait for the Cable Check of the EVSE to finish indicated by the reception of a CableCheckRes with ResponseCode equal to “OK” and EVSEProcessing equal to “Finished”.

NOTE 2 In this document, receiving a response message is described by A-Data.confirmation.

[V2G2-702] The EVCC shall stop waiting for the Cable Check of the EVSE to finish and stop monitoring the V2G_EVCC_CableCheck_Timer when V2G_EVCC_CableCheck_Timer is equal or larger than V2G_EVCC_CableCheck_Timeout. It shall then apply the error handling as defined in subclause 8.8.

[V2G2-703] The EVCC shall stop waiting for the Cable Check of the EVSE to finish and stop monitoring the V2G_EVCC_CableCheck_Timer if V2G_EVCC_CableCheck_Timer is smaller than

V2G_EVCC_CableCheck_Timeout and a CableCheckRes message with ResponseCode equal to “OK” and EVSEProcessing equal to “Finished” was received. It shall then process the response message as defined in subclause 8.8.

NOTE 3 In this document, receiving a response message is described by A-Data.confirmation.

8.7.3.7 EVCC Timing for pre charging

[V2G2-704] The EVCC shall set the timeout V2G_EVCC_PreCharge_Timeout to the value as defined in Table 111, reset the V2G_EVCC_PreCharge_Timer and start monitoring the V2G_EVCC_PreCharge_Timer when sending the message PreChargeReq for the first time in a charging session.

NOTE In this document, sending a request message is described by A-Data.request.

[V2G2-705] The EVCC shall wait for the Pre Charging to finish, indicated by the EV determining that the EVSE output voltage, as measured inside the EV, has sufficiently been adjusted to the EV RESS voltage.

[V2G2-706] The EVCC shall stop waiting for the Pre Charging to finish and stop monitoring the V2G_EVCC_PreCharge_Timer when V2G_EVCC_PreCharge_Timer is equal or larger than V2G_EVCC_PreCharge_Timeout. It shall then apply the error handling as defined in subclause 8.8.

[V2G2-707] The EVCC shall stop monitoring the V2G_EVCC_PreCharge_Timer when V2G_EVCC_PreCharge_Timer is smaller than V2G_EVCC_PreCharge_Timeout and Pre Charging has finished, indicated by the EV determining that the EVSE output voltage, as measured inside the EV, has sufficiently been adjusted to the EV RESS voltage. It shall then process the response message as defined in subclause 8.8.

8.7.4 V2G message synchronization with IEC 61851-1 signalling

8.7.4.1 Overview

ISO 15118 based charging control extends the IEC 61861-1 signaled charging. For this, the messaging on application layer is synchronised with the CP States defined in IEC 61851-1.

ISO 15118 based messaging is able to manage the AC and DC charging process for a complete charging session from the beginning to the end in 5% duty cycle case.

For AC, ISO 15118 also allows to start charging based on IEC 61851-1 (Basic Charging, BC) and switch to ISO 15118 based charging control (High Level Communication Control, HLC-C) later.

In this subclauses, terms and definitions in requirements are applied as defined in *Part 3* and IEC 61851-1.

Figure 100 shows an example for AC and DC charging with BC and HLC-C in relation to the phases Data Link Setup, V2G Setup, and V2G Charging Loop during a V2G Communication Session. The figure also shows an example for the most important entry and exit conditions for the phases. In case of AC a BC phase can be applied. In general, BC before HLC-C requires a nominal Duty Cycle instead of a 5% Duty Cycle.