Nokia Siemens Networks

SGEM WP5
Deliverable 5.2.2: Requirement Description

Task 5.2.1 Operation and service architecture for distributed charging station infrastructure

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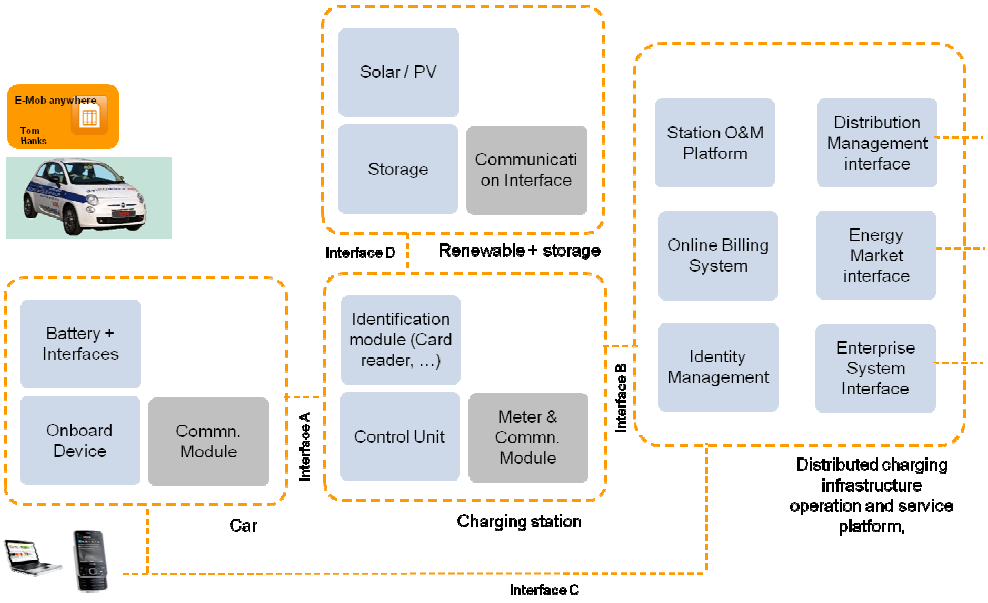
1. Introduction

While deliverable D5.2.1 covered the Use case descriptions, this documents provides a consolidated list of requirements of a platform that can operate and provide services using a distributed charging station infrastructure.

To recap, the proposed high level architecture of the platform is shown below:



2. Interfaces

Interface	A
Description	This interface comprises the electric interface for charging of batteries and optionally interfaces for exchanging information with the charging station / backend infrastructure
Use cases	Vehicle charging service delivery use cases
Technology / Standard	IEC62196, ISO15118, Vendor specific

Interface	B
Description	This interface is used by charging station for exchanging information with backend infrastructure e.g. authentication / authorization of charging session
Use cases	Vehicle charging service delivery use cases, Charging station lifecycle use cases
Technology / Standard	ISO15118, Vendor specific

Interface	C
Description	This interface is used by end user for exchanging information with backend infrastructure e.g. to receive notifications, to check

	available charging stations, to reserve, to see
Use cases	Vehicle charging service delivery use cases, Billing lifecycle and information use cases
Technology / Standard	ISO15118, Vendor specific

Interface	D
Description	This interface comprises the electric interface for charging of batteries and optionally interfaces for exchanging information on status of locally available energy
Use cases	Vehicle charging service delivery use cases, Charging station lifecycle use cases
Technology / Standard	Vendor specific

3. General requirements

Following are the general requirements to the platform.

Software-as-a-Service (SaaS)	▪ Platform shall support delivery through SaaS delivery as well as a traditional software delivery model ▪ Platform shall allow definition and reporting against expected SLAs ▪ platform shall produce detailed Usage Data Records for various services
Multi-tenant	▪ Platform shall support multiple tenants (projects / customers) from the same physical deployment ▪ Platform shall include necessary security mechanisms to ensure clean separation of data of tenants ▪ Platform shall allow tenant specific customization & branding
Cloud	▪ Platform shall support a Hybrid Cloud infrastructure (both Public and Private) ▪ Platform shall be flexible to shift from one cloud vendor to another
Self-Service	▪ Users of the platform must be able to perform (nearly) all of the operations themselves
Automation	▪ Platform shall include automation tools that continuously monitor the system
Availability	▪ Platform shall be designed with redundant components to support expected Availability requirements. It's expected that different levels of availability will be required (Ex. Vehicle Charging with a high level of availability compared to portals)
Extensibility	▪ Platform shall be designed to allow extension e.g. new charging stations, new user interfaces, etc. Proven methods

	that enable this (e.g. interface & implementation de-coupling, data & logic separation) must be used ▪ All interfaces (both internal & external) must be versioned so that user components can degrade gracefully
Localization	▪ Platform must offer user interfaces in the local language ▪ Platform must support multiple languages simultaneously ▪ Platform must allow easy introduction of new languages (e.g. by configuration files rather than modification of logic)

4. Functional requirements

4.1 Service delivery related

Area	**Requirement**
SMS initiated service delivery	
Input validation	SMS requests must be parsed for syntactical correctness and if incorrect a suitable informative reply to be sent
Start	If a station is not available (Ex. disabled, in-use), requests must be rejected with a suitable informative reply
Start	The identity of the requesting user must be verified (whether casual or registered)
Start	The validity of registered user must be verified (whether still allowed to use service)
Start	After validation, relevant control command must be issued to the Charging station to allow charging based on class of user
Start	If cable is not inserted within allowed duration (found through status message from station), suitable informative message should be sent to user (Ex. check station number & connect cable)
Subscription card initiated service delivery	
Start	The identity of the requesting user must be verified (whether casual or registered)
Start	The validity of registered user must be verified (whether still allowed to use service)
Common	
Start	An interface must be provided to check if a given user is still a valid user or not. Validity conditions can include status flags, current balance, etc
Session	A session concept must be implemented to maintain the session state machine for each station (Station Id, State, and User Phone number). The state machine is described in chapter **Error! Reference source not found.**.
Session	Session concept / state machine implementation must support simultaneous usage of a station by two different users. This feature must be configurable (i.e. applicable only for certain stations)
Session	Based on transient error/warning/info messages from the station suitable informative message to be forwarded to the user
End	If the station is not involved in a session, a request to end the

	session must be rejected with a suitable informative reply
End	If the metering information from Station does not arrive within a fixed duration, suitable control command must be issued to fetch the consumption data
End	From received meter data, session data record must be created & forwarded to the Online Billing System (Customer Id, Meter data including relevant timestamps)
End	Session data must be persisted to support reporting purposes (Station, Start time, End time, User Phone number, Customer Id)
End	Usage data must be validated and errors recorded in a log file
Session	Session duration must be monitored; when duration exceeds a threshold, energy flow must stopped and a warning message generated and sent to a Operation center
Portal	Platform must provide a subscriber portal through which subscriber can authenticate and initiate charging sessions

4.2 Subscriber lifecycle related

Area	**Requirement**
Registration	Input data must be parsed for syntax correctness
Registration	Input data must be validated to check duplication (Ex. Phone number, Customer Id duplication)
Registration	On successful validation, customer must be registered in Identity management and Billing systems
Registration	Registration must support adding and removing of multiple Subscription card / phone number details with each subscription
Registration	Registration must support single user & bulk user use cases (online & batch mode)
Registration	An interface to de-register user must be provided; the implementation should remove the user from Identity Management and Billing systems.
Portal	Platform must provide a subscriber portal through which subscriber can view his profile information and modify certain attributes (e.g. email)

4.3 Billing related

Area	**Requirement**
Monthly Invoice	Platform must generate bill data records for all subscribers in xml format; the data records must contain all the information about the session after applying necessary tariff rules
Prepaid	Platform must maintain an account balance for prepaid subscribers
Prepaid	At the beginning of each charging session, Platform must reserve a suitable amount in the account balance; at the end of the session, usage amount must be calculated per tariff rules and deducted from the account balance
Prepaid	When there is insufficient balance, platform must disallow charging sessions or allow charging session of a minimum value; this must be configurable
Portal	Platform must provide a subscriber portal through which user

	can view his service usage (e.g. date, time, station, energy, monetary amount for each of the charging sessions)

4.4 Station lifecycle related

Area	Requirement
Configuration	Platform must support create / modify / delete lifecycle for Charging Station / Charging Site;
Configuration	Platform must support common parameters for all charging stations and vendor / technology specific extension parameters
Configuration	Common information must include the geographical information (latitude, longitude and other location related aspects)
Configuration	Platform must support placing the charging station in various states (e.g. Active, In-use, Test, Disabled)
Test	Platform must support creation of test sessions (which may use a default authentication / authorization credentials); for security measure, test session durations must be controlled (e.g. not more than 5 minutes)
Portal	Platform must provide a web based portal through which various administration activities can be performed
Portal	Platform portal must show a map based view of all charging stations along with their current state

5. Abbreviations

CRM	Customer Relationship Management
ECS	Emobility Central System
ICT	Information and Communication Technology
SGEM	Smart Grids and Energy Markets

6. References

1. SGEM D5.2.1 Use Case Descriptions
2. IEC 62196 (http://en.wikipedia.org/wiki/IEC_62196)

7. Document History:

Version	Changes	Modified by	Date
1.0	**First publication**	**T. Kabilan**	**8-Feb-2012**