AutoPASS Requirement specification

2.1 – Terms and definitions

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1.0	2010	Per Einar Pedersli	Terms and definitions gathered in one document
2.0	08.04.2011	Per Einar Pedersli	Includes terms and definitions for all AutoPASS requirement specifications
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Content

1. TERMS AND DEFINITIONS

For the purposes of the AutoPASS suite of system specifications and requirements, the following definitions apply:

2TDES	Triple *DES*, using two different keys: k1,k2, k1, key size = 128 bit (including 16 parity bits)
3TDES	Triple *DES*, using three different keys: k1,k2,k3, key size = 192 bit (including 24 parity bits)
access credentials	A trusted attestation or secure module that establishes the claimed identity of an object or application before information exchange is allowed to take place.
additional contract	A contract between a User and another TSP than the TSP who issued the OBE and main contract. NOTE: An Additional contract can only be established with reference to an AutoPASS OBE that already is linked to an AutoPASS contract.
ASCII	American Standard Code for Information Interchange
automatic number plate recognition (ANPR)	A method that uses Optical Character Recognition on images to read the license plates on a vehicle. NOTE: In AutoPASS we use the term *ANPR accepted*, this is the rate for correct reading of the license plate. This is also named as the OCR hit rate.
automatic remote monitor	Monitoring the system quality continuously, every hours and days with fee collection.
automatic vehicle identification (AVI)	The automatic identification of a vehicle by means of the OBE mounted in the vehicle.
AutoPASS Contract	A contract between a User and a TSP that gives the user access to the AutoPASS service. NOTE: The contract may also include the provision of an initialised AutoPASS OBE linked to a central account (payment means).
AutoPASS Contractual framework	A suite of contracts and rules regulating the rights, mutual obligations, roles and responsibilities, tasks and the daily operation of AIP.
AutoPASS Integrated Payment (AIP)	The AutoPASS concept enabling the User to have one contract and one OBE to be used in all EFC systems providing the AutoPASS service.
AutoPASS OBU Customer	See User
AutoPASS On-board Equipment (OBE)	An electronic device, also called AutoPASS tag, mounted in the vehicle enabling communication based on DSRC between the vehicle and the roadside equipment (RSE) installed at a charging point.
AutoPASS On-Board	See AutoPASS OBE

Unit (OBU)	
AutoPASS passage	A passage through a charging point where the AutoPASS contract is used as a payment means.
AutoPASS platform	All technical and functional specifications, contracts and other documents describing how the AutoPASS service shall be an interoperable payment service for the users.
AutoPASS service	The transport and payment service provided in a co-operation between the infrastructure owner providing the transport service and the TC and TSP providing the payment service.
AutoPASS User	See User.
availability (i)	Ad security: Data and information are available to authorised parties.
availability (up time) (ii)	Ad reliability: The degree to which a system suffers degradation or interruption in its service to the User, TSP and TC as a consequence of failures of one or more of its parts. NOTE: It is calculated by the total amount of hours where the system (or parts of it) does not suffer degradation or interruption in its service during an observed period, divided by the total number of hours of the same observed period.
CD	Compact Disc
CEN	Comité Européen de Normalisation
central account	An account that contains the AutoPASS User rights and that is established, owned and managed by a Toll Service Provider. NOTE: The AutoPASS User rights are usually expressed in terms of an amount on an account showing the balance in favour of the user (pre-payment) or the balance in favour of the Toll Service Provider (post-payment).
central system (CS)	The back office computer system for the TSP or the TC.
CEST	Central European Summer Time
CET	Central European Time
charging area	Area within the CP where the use of the transport service is registered and Vehicle Passage Data for the AutoPASS User is collected.
charging by LPR	Charging an AutoPASS User without OBE or without a compliant or valid OBE.
charging by OBE	Charging an AutoPASS User equipped with an OBE holding a valid Central Account at a Toll Service Provider.
charging point (CP)	The physical point or zone where the use of the transport service is registered and the user is offered one or more payment methods paying for the transport service, e.g. a central account based on the AutoPASS OBE.
charging point equipment (CPE)	All equipment installed at a charging point, e.g. a toll station, enabling the TC operating the CP and collecting the fee by the different payment methods offered to the users.

classification	The process of dividing vehicles into various classes according to certain classification parameters, e.g. weight, length, purpose of use, engine type, number of axles, actual number of passengers.
Collection and Forwarding Central (CFC)	Equipment in the responsibility of the Collection and Forwarding operator.
Collection and forwarding operator	The entity that collects and possibly aggregates transactions from one or more TC for delivery to the TSP as well as collecting and aggregating information from the TSP to be distributed to the TC.
component	A physical element, being part of the CPE, including both the hardware and software.
confidence level	A parameter that gives the assurance that the statistical model is correct.
CR	Carriage Return, for an ASCII character set it corresponds to 0x0D.
critical component	Necessary components for toll collection assuming that no other components can temporarily collect and store information leading to toll collection
cryptography	The discipline which embodies principles, means, and methods for the transformation of data in order to hide its information content, prevent its undetected modification or/and prevent its unauthorised use [ISO/IEC 7498-2].
data group	A collection of closely related EFC data attributes which together describe a distinct part of a transaction.
Daylight Saving Time (DST)	Also known as summer time and is the practice of advancing clocks so that afternoons have more daylight and mornings have less.
declared vehicle characteristics	A data set stored in the OBE containing vehicle characteristics of the vehicle that the OBE is related to by the contract.
Dedicated Short Range Communication (DSRC)	Dedicated Short Range Communication are one-way or two-way short- to medium-range wireless communication channels specifically designed for automotive use and a corresponding set of protocols and standards.
DER	Distinguished Encoding Rules
DES	Data Encryption Standard
design verification test (DVT)	Tests performed after final design to verify functionality, architecture and implementation solutions.
DSRC Equipment	The equipment installed at a Charging Point to communicate with the OBE.
DVT	Design Verification Test
E2E	End-to-end

EFC ContextMark	Identifies the Toll Service Provider, the type of contract and the context version.
electromagnetic compatibility (EMC)	Compliance with respect to the unintentional generation, propagation and reception of electromagnetic energy with reference to the unwanted effects (Electromagnetic interference, or EMI) that such energy may induce.
Electronic Fee Collection (EFC)	The collection of a fee for a transport service where the fee is collected via the exchange of data, e.g. via an air-link communication, enabling the user to pay for the transport service with electronic values, e.g. an electronic purse or values stored in a central account.
electronic register identification (ERI)	See AVI
EN	European Norm
End User	User equipped with an OBU and that holds a central account in the Central System.
enforcement	Measures or actions performed by enforcement authorities or other organisations to achieve compliance with laws, rules and regulations, e.g. the process of retrieving the payment for a transport service from a user that has violated the system by not paying for the service that has been used.
Enforcement operator	An entity handling the enforcement of users.
ETSI	European Telecommunications Standards Institute
EWP	End of warranty period.
exception handling	The process of dealing with errors related to lack of identifying the OBE at the CP. NOTE: The process tries to recover the toll by charging the AutoPASS OBE Customer's Toll Service Provider via his/hers Central Account.
Exception Message	A report of an event in the system. NOTE: Exception Messages in the system are 'fatal', 'alarm', 'error message', 'warning' and 'information'. 'Fatal', 'alarm' and 'error message' signals event/state that either change equipment's ability to operate or some unexpected behaviour that may affect the ability to operate. 'Warning' and 'information' signals event/state that does not have any immediate consequences for the functionality or operability of the system.
Factory Acceptance Test (FAT)	Tests performed after design, construction and development to verify functional and technical requirements.
fee collection time period	The defined time when the charching point is set to collect fee for the Toll Charger.
FIPS-140/2	The Federal Information Processing Standard Publication 140-2 Series that specifies the requirements and standards for cryptography modules which include both hardware and software components.

Foreign EFC operator	From a vehicle point of view, a foreign EFC operator is another operator than the one who issued the OBE used in the vehicle NOTE: Term used for first version of AutoPASS OBE.
Foreign OBE	From a RSE viewpoint, a foreign OBE is an OBE personalised with the secret keys belonging to another operator than the operator operating the toll plaza in which the transaction take place. NOTE: An OBE personalised with secret keys belonging to another operator than the one who operates the toll plaza in which the transaction takes place. NOTE: Term used for first version of AutoPASS OBE
Foreign vehicle	From a RSE viewpoint, a foreign vehicle is a vehicle equipped with an OBE issued by another operator than the one who owns the roadside equipment in which the transaction takes place. NOTE: A vehicle equipped with a foreign OBE NOTE: Term used for first version of AutoPASS OBE
Hard shoulder	Hard shoulder is the area outside the normal regulated driving area, but it is possible for a vehicle to drive there. NOTE: Charging area must also cover the hard shoulder at the charging point.
Hardware Security Module (HSM)	A Hardware Security Module that will be used to perform the AutoPASS MAC validation.
IAT	Integration Acceptance Test
ID	Identifier
image	A picture of an vehicle used for charging by LPR
Image Text File	File used to define texts to be printed in the Vehicle Image.
In Service Test (IST)	This is a test of the short- and long-term properties of the equipment. NOTE: The purpose of the Acceptance period is to verify requirements that can only be tested during a certain time of use. This is typical for tests of the system's performance and durability, as well as verification of statistical parameters. A sufficient sample is needed to achieve statistical significance.
In Service Test Long-time (IST-L)	IST long-term tests the complete system during 9 months after approval of IST short-term and is therefore a fulfilment of the long-term requirements to the equipment.
In Service Test Maintenance (IST-M)	The In service test maintenance (IST-maintenance) is a test of long-term properties of the equipment, to be performed once a year during the operation period. NOTE: The purpose of the test is to verify that the quality is maintained on the same level as specified in the Requirement specification. This is typical for tests of the system's performance and durability, as well as verification of statistical parameters. A sufficient sample is needed to

	achieve statistical significance.
In Service Test Short time (IST-S)	IST short-term tests the system during 3 months. NOTE: The IST short-term period starts at the time of start of fee collection. All Charging points are in normal operation mode.
incident	Any event which is not part of the standard operation of a service and which causes, or may cause, an interruption to, or a reduction in, the quality of service.
infrastructure owner	Entity owning, operating and maintaining the infrastructure where the user has to pay a fee.
integrity	Sensitive data, information and message sequencing are guarded in such a way that any alteration or destruction by unauthorised parties is detected (integrity of contents, integrity of message sequence).
integrity of data	The characteristic of data and information being accurate and complete, and the preservation of accuracy and completeness. The property that data has not been altered or destroyed in an unauthorised manner.
interoperability	The ability of systems to provide services to and accept services from other systems and to use these services to enable the systems to operate effectively together.
interrogation	The communication process initiated and controlled by the RSE towards the OBE, usually when the OBE enters the RSE communication zone as the vehicle is about to pass the CP.
ISO	International Standardisation Organisation
key performance indicators (KPI)	Key performance indicators (KPI) are quality indicators for operating the EFC system. NOTE: KPI's are defined in maintenance agreement and are reported periodically.
KGN	Key generation indicates which key pair of an AutoPASS key set to use.
LED	Light Emitting Diode
LF	Line Feed, for an ASCII character set it corresponds to 0x0A.
licence plate number (LPN)	The unique registration number of the vehicle normally placed both at the front and at the rear end of the vehicle.
main State	State within the CP being either Charging, Stand-by or Off.
maintainer	The person who does maintenance work on the system.
maintenance agreement	The maintenance agreement between the customer and contractor regulates the work and commercial aspects for the maintenance work. NOTE: The maintenance of the AutoPASS charging point equipment is a crucial aspect for the availability and reliability of the fee collection system.

Mean Time Between Failure (MTBF)	The average time that a component works without failure. NOTE: It is calculated by the total number of observed operating hours divided by the total number of observed failures.
Mean Time To Repair (MTTR)	The average time to restore a component to operational condition.
Message Authentication Code (MAC)	A Message Authentication Code (MAC) is an implementation of checkvalue encryption, which can be computed as defined in ISO 8731, ISO 9797, ISO/IEC DIS 10118. NOTE: A Message Authentication Code is used to protect the integrity of data.
monitor and control data	The set of data consisting of Operator File, Image Text File and Exception Message.
Monitoring and Control Centre (MCC)	Location of the Monitoring and Control System for all Toll Systems delivered by one Toll System supplier.
Monitoring and Control System (MCS)	Centralised monitoring and control system for all Charging Points from a specific vendor. NOTE: MCS monitor, control and maintain the functionality of the CPE. E.g. handle exceptions, alarms from the CPE, Control the CP Main State and maintain the CPE.
monolane	Road/charging point with only one lane in the same driving direction, or multiple lanes with physical separation between lanes.
multilane	Road/charging point with more than one lane in the same driving direction without any physical separation between lanes. NOTE: May have two categories: • Solid line (no crossing) between lanes • No lane crossing restrictions
Native EFC operator	From a vehicle point of view, a native EFC operator is the same operator as the one who issued the OBE used in the vehicle. NOTE: Term used for first version of AutoPASS OBE
Native OBE	From a RSE viewpoint, a native OBE is an OBE issued by the same operator than the one who owns the roadside equipment. NOTE: An OBE personalised with the secret keys belonging to the operator who operates the charging point in which the transaction takes place. NOTE: Term used for first version of AutoPASS OBE

Native vehicle	From a RSE viewpoint, a native vehicle is a vehicle equipped with an OBE issued by the same operator than the one who owns the roadside equipment. NOTE: A vehicle equipped with a native OBE NOTE: Term used for first version of AutoPASS OBE.
non-equipped User	A user that uses a transport service provided by the Toll Charger and who is not equipped with a compliant or valid OBE.
NTP	Network Time Protocol
OBE Statuslist	A list from the Toll Charger's Central System consisting for each OBE ID: • Whether the OBE shall be accepted or not accepted as a payment media, • Status of the Central Account related to the OBE, • Actions related to the vehicle passage (whether Vehicle Images shall be collected or not), • Vehicle class, • Vehicle Licence Plate Number, • Expiry date of the contract.
OBU	See OBE
OBU Manufacturer	The producer of the OBU.
On-Board Equipment (OBE)	Equipment fitted within or on the outside of a vehicle and used for toll purposes. NOTE: As a minimum the component of the OBE always includes a DSRC interface.
On-Board Account	An account, which is containing service rights and which is being held under the responsibility of the user, e.g. data stored on an IC-card.
Operator	See Toll Charger
Optical Character Recognition (OCR)	The electronic translation of an image into machine-editable text. NOTE: Used for translating a vehicle license plate number.
payment information	The information that an AutoPASS OBE or AutoPASS card sends to the roadside equipment in a charging point enabling the Toll Charger to prepare a claim to the Toll Service Provider.
payment means	Value (e.g. cash or electronic values in an electronic purse) or a contract (e.g. a ticket or an agreement related to a central account) between the user and the issuer of the payment means that gives the user access to the services available.
payment medium	The carrier of payment means (such as ticket, card or on-board unit).
payment method	The combination of Payment means, payment mode and payment scope.

payment mode	Concept defining the time dimension in payment (pre-payment, immediate payment or post-payment).
payment scope	The field of application in which the payment means is accepted, e.g. transport.
payment system	A financial system that includes the complete process of issuing and use of payment means, clearing and settlement of transactions.
pixel	A pixel (or picture element) is the smallest element of information in an image.
privacy	The right of individuals to control or influence what information related to them may be collected and stored and by whom and to whom that information may be disclosed.
Production Test (PT)	A test performed on all produced units, and includes screening and logging of parameters. NOTE: The reason for performing the PT is to test the produced units as early as possible, to avoid malfunctioning devices being shipped to the Contractor.
receipt	A document issued as a proof of a completed transaction (manual tolling).
redundancy	Redundancy is the duplication of critical components of a system with the intention of increasing availability of the system
reliability	The ability of the equipment to perform a required function under stated conditions for a stated period of time.
requirement specification	A complete description of the behaviour of a system.
response time	The time a system or functional unit takes to react to a given input. NOTE: In a help desk situation response time is defined as the time period from receiving a request until an answer to that request has been given. When an error is reported the response time is defined as the time period from receiving the error message until the situation have been analysed and an estimated time to repair is communicated.
retailer	An entity that acts on behalf of a TSP, e.g. a gas company retailing AutoPASS contracts with the users.
Roadside Equipment (RSE)	Equipment installed at a charging point in order to communicate with the AutoPASS OBE or card as well as collecting other information needed for handling both users equipped and not equipped with AutoPASS OBE or card.
Roadside Unit (RSU)	The DSRC part of the RSE whose functionality is to communicate and exchange data with vehicles passing the charging point.
RSA	Asymmetric public key encryption method, named after Rivers, Shamir and Aldemann
security scheme	The set of cryptographic algorithms and security mechanisms related to the OBE and RSE operations defined in these

	specifications
service level agreement (***SLA)***	A part of a service contract where the level of service is formally defined.
Service provider	See Toll Charger.
SHA-1 / 256	Secure Hash Algorithm – 1 / 256, an method to compute a secure message hash function (message digest)
signal code	A number categorising the vehicle passage through the charging point, e.g. Approved passage in AutoPASS lane (code = 02) and Passage in AutoPASS lane with an OBE from an unauthorized TSP (code = 28).
Site Acceptance Test (SAT)	The SAT is performed in order to verify that a specific site is delivered and installed in accordance with the contract requirements. This will then include checking both what is delivered and that the functionality is as specified. The SAT shall enable the Toll Charger to start collecting fees.
spot test criteria	Specific criteria for how and when Vehicle Images shall be collected at a Charging Point.
spot test mode	A mode that enables the Toll Charger to collect Vehicle Images defined by a Spot Test Criteria.
standby condition	For OBE, means the OBE is ready to respond to a RSE but has not entered any communication zone yet. NOTE: If the OBE detects vehicle movement, it shall be in a state as if mounted in a vehicle that is moving. If it detects the presence of a RF signal, it may be in a state waiting for RF signal.
subcontractor	A company that has a contract with a toll company where the subcontractor performs parts of the tasks the toll company has as a TSP and TC.
Sub-system	For the purposes of this specification document, the term sub-system designates either the OBE, RSE or CS.
System life time	Time period for which the system shall operate. NOTE: for AutoPASS system the normal system life time is 15 years.
tariff	Price corresponding to the vehicle characteristics and/or the type of use and/or the driver characteristics.
tariff table	A set of data specifying: • Time windows for which the tolls applies, • Price for the vehicle classes.
test reader	Special OBE reader used to test the OBE. NOTE: In principle a portable RSE with facilities to control the link budget.
Toll Charger (TC)	A legal entity charging for use of the infrastructure in a toll domain
toll company	A company that together with the owner of the infrastructure is responsible for the financing of the infrastructure. NOTE: In relation to the AIP the toll company is often both a TSP

	and a TC.
toll domain	An area or a part of a road network where a certain toll regime is applied.
toll regime	The set of rules governing the collection of toll in a toll domain including enforcement.
Toll Service Provider (TSP)	A legal entity providing user toll services on one or more toll domains for one or more classes of vehicles. .
traffic Island	A median strip, a strip in the middle of a road. NOTE: It can also be a narrow strip between roads that intersect at an acute angle.
transaction	A set of data elements collected at a Charging Point whenever a vehicle passage takes place. NOTE: Content depends of type of vehicle passage and may contain amongst others time, place, OBE ID, classification, amount paid, security and potentially reference to Vehicle Images.
transport service	Road transport related facility provided by a TC. NOTE: Normally a type of infrastructure, e.g. a toll toad or a road network inside a toll ring, the use of which is offered to the User for which the User is requested to pay.
Trusted Third Party (TTP)	The entity that is responsible for security assessment including security key management.
uninterruptible power source (UPS)	An electrical apparatus that provides emergency power to a load when the input power source, typically the utility mains, fails.
User	A customer of a TSP. NOTE: The User may also be described as the contract partner, the vehicle owner and the driver in those cases where these are not the same person or company.
User interface (UI)	The user interface is the aggregate of means by which people—the users—interact with the system. NOTE: The user interface provides means of input to and output of the system.
UTC	Coordinated Universal Time
UTF	Unicode Transformation Format
vehicle Image	An image taken at the CP that serves the purpose of documenting the vehicle passage by having the vehicle and the vehicle's licence plate in the image.
vehicle passage data	Collection of data for a vehicle passage, consisting of a Transaction and potentially Vehicle Images.