

Universal Postal Union

EMS Cooperative

EMS Simple Monitoring and Reporting Tool (SMART) and EMS Operational Guide

Statement of work

July 2021

Table of contents	Page
1 Introduction and contractor's tasks	3
2 Glossary	6
3 Description of EMS SMART	9
3.1 General description	9
3.2 Cockpits and dashboards	9
3.3 Types of measurement	10
3.4 EMS SMART statistics repository	11
3.5 Other functionalities of SMART	12
3.6 External links menu	14
3.7 Access levels	14
3.8 SMART – Integration platform	14
3.9 Side bar	14
4 Technical details of EMS SMART	15
5 Description of the EMS Operational Guide and single sign-on	16
6 Technical details of the EMS Operational Guide and single sign-on	22
7 Public track and trace	22
8 Connection with the i-Care system	22

1 Introduction and contractor's tasks

The Universal Postal Union (UPU) is an intergovernmental organization and specialized agency of the United Nations, based in Berne, Switzerland. It hereby invites tenders concerning the implementation of standards adopted for the operation of the Express Mail Service (EMS) by designated operators. The selected contractor will provide services in accordance with a signed contract and in line with the UPU's general terms and conditions.

Bidders are invited to submit tenders for the provision of services as set out below.

N.B. – A glossary of terms and abbreviations is provided in section 2.

Task 1 – Provision of maintenance and support for the EMS Simple Monitoring and Reporting Tool (EMS SMART), EMS Operational Guide, single sign-on, track-and-trace function for the EMS Cooperative website, and interface with the i-Care system

This task comprises maintenance and support for existing systems, including EMS SMART and the EMS Operational Guide, the production and integration platforms, the development testing environment, single sign-on, the public tracking function for www.ems.post, and the interface for the reference data feed and tracking function for the EMS Cooperative's i-Care system. The contractor should reuse the existing system components and new development should be performed on top of the existing code base.

The systems are required to operate with an availability rate of 99.4%. System stability is therefore of great importance. In the event of a disaster, the systems must be recovered within four hours.

Any system downtime for maintenance or the implementation of changes must be agreed with the EMS Unit sufficiently far in advance that appropriate notification can be provided to users. EMS SMART downtime should be kept to a minimum and only in very rare cases should it be visible to users. Scheduled maintenance may be performed subject to a minimum of two weeks' notice. When system downtime is scheduled, a courtesy message in multiple languages shall be published to inform users that the system is under maintenance and to indicate the duration of the maintenance period (times to be provided in GMT).

System maintenance should include regular software updates.

A service desk should be available to the EMS Unit during normal business hours (CET/CEST) from Monday to Friday via e-mail and telephone. The submission of incidents by e-mail is highly preferable to a ticketing system.

Expected incident resolution is as follows:

<i>Priority</i>	<i>Log/reply</i>	<i>Resolution (depending on complexity)</i>
1 (high)	1 hour	1-2 business days
2 (medium)	3 hours	Up to 4 business days
3 (low)	5 hours	Up to 8 business days

Incidents should be submitted to the service desk by the EMS Unit on behalf of users.

Incident priority is to be defined by the EMS Unit. The escalation method should be defined with the contractor and requests are to be escalated by the EMS Unit if an incident is not resolved within the expected time.

The contractor should provide support for the EMS Unit's report-generation activities in SMART, prepare synchronizations of the UPU code lists, and be available for urgent troubleshooting during report generation, which takes place over one to two days on a monthly basis according to an agreed schedule.

Maintenance of EMS SMART includes monitoring system stability, fixing bugs and implementing minor improvements to functionalities, such as adding and removing new designated operators if needed, and making label adjustments. The contractor is expected to monitor the connection to the EDI data platform and liaise with the database support team in the event of any problems with the EMS Bubble.

Maintenance of the EMS Operational Guide and single sign-on includes monitoring, troubleshooting, adding new user roles or changing the privileges assigned to current user roles, implementing minor improvements to EMS Operational Guide functionalities, etc.

Maintenance of the track-and-trace feature includes monitoring to ensure sufficient capacity, troubleshooting, and implementing changes to data display restrictions (which may occur on an infrequent basis).

The contractor must also monitor the i-Care interface to ensure that it remains operational at all times.

All necessary software licenses are the responsibility of the contractor. No separate or additional charges may be made to the UPU in this regard.

Regular meetings should be held with the UPU to discuss system needs, plans and open issues. While developments are in progress, these meetings are to be held weekly. Liaison via e-mail is as required, on an almost daily basis.

Task 2 – Hosting of EMS SMART, EMS Operational Guide, single sign-on and related components

The contractor should provide hosting for EMS SMART (www.emssmart.post) and the EMS Operational Guide (www.emsog.post), and for both production and integration platforms, development testing environments, single sign-on, public tracking on www.ems.post and the tracking function in i-Care (www.icare.post).

The systems are expected to be accessible to end users 24/7 via the public Internet.

The data contained in the EMS Operational Guide, and especially in EMS SMART, must be protected against unauthorized access. Data security is therefore of great importance.

EMS SMART is required to respond to requests from an end user within two seconds. Pages for operators with the largest volumes of data may take a bit longer. The system is used by approximately 600 active users from 165 countries and territories, with an average of 100 logins by fewer than 100 users per day.

EMS Operational Guide page rendering: as the system needs to be available and usable by postal operators around the world, its usability, in terms of rapid rendering of pages following a user action (e.g. clicking on a button or a link), is an important factor.

The maximum admitted page rendering latency shall be no more than 1,000 milliseconds (1 second) and shall be measured using a multi-site tool (e.g. GTmetrix, Uptrends). Data packets originate from various geographic locations (e.g. North America, Asia, Africa) and it must be possible to compare latency from multiple world regions. This value is displayed in a header section of the webpage.

Database query execution: database queries shall be performed independently of the technology used and within approximately 500 milliseconds. The value of the query execution time is also displayed in a header section of the webpage.

The contractor may use the same hosting solutions as those currently used, but under its own management, or may propose any other hosting solution that would ensure at least the same level of system performance, security and stability.

Task 3 – Ad hoc developments to all EMS systems and components listed above

Changes may need to be made to EMS SMART each year. For example, this may include changes to calculation rules, adjustments of the measurements in accordance with new targets and standards, or the development of new reports.

Any newly developed measurements, reports and functionalities usually need to be added to the usage statistics table, alerts menu and activity audit.

From time to time, changes may need to be made to the EMS Operational Guide and single sign-on. For example, this may include the addition of new queries or functionalities to the EMS Operational Guide or additions to usage statistics.

All new developments should be documented in detail with regard to calculation rules and technical specifications. Updates to the existing documentation may be required. A new development is considered as delivered after final acceptance by the UPU and on condition that the relevant documentation has been provided.

The scope of ad hoc developments is not defined in advance. Such requirements may be triggered by changes to UPU regulations, members' requests or business needs. The scope of such development requirements is drawn up on a case-by-case basis and the necessary effort evaluated by the contractor. The UPU then decides whether or not to proceed with the development. Up to 80 days of development are usually required each year. In the event of a special project or extensive set of measurements, this number may be greater. The contractor should be able to accommodate the necessary development time if the UPU bodies require certain changes by a specific deadline.

The contractor should have the necessary business understanding and expertise to advise the UPU on technical requirements based on business needs, and shall contribute to the process of drawing up the scope of requirements, in consultation with the UPU, with regard to the feasibility and technical efficiency of the required developments. The contractor should be able to propose relevant solutions, offering a modern design with a user-friendly and efficient layout of new features in EMS SMART and the EMS Operational Guide.

All developments should first be applied to the test platforms, which are copies of the production platforms, on which new features can be tested by the UPU and test groups of EMS Cooperative members.

The development process is often iterative, especially in the case of new measurements or reports. Owing to the complexity of preparing initial requirements without a simulation, it is difficult to evaluate whether requirements are complete or entirely correct and do not interfere with existing calculations. The contractor should be prepared to work using this method.

Task 4 – Development of a new EMS SMART functionality

Based on the needs of the EMS Cooperative, an additional EMS SMART feature needs to be developed. The contractor will be required to develop this new function based on the specifications provided in Annex 1. This is a one-time assignment. Any other developments required will be treated as ad hoc developments.

All developments should be documented in a timely manner, including the calculation rules.

Task 5 – Transition from the current provider to the new contractor

The contractor should ensure the smooth takeover of all existing systems and applications from the current provider, without performance interruptions. It should be noted that international accounting is dependent on the correct and timely calculation of certain parameters.

The UPU will provide the contractor with training on EMS processes and related systems, over the course of several days.

The contractor should obtain the necessary knowledge regarding the EMS systems, installations and processes from the current provider, and make the necessary preparations to take over the systems and set up a stable hosting solution for the systems.

Tests should be performed to demonstrate the readiness of the new solution to the UPU.

The contractor must also ensure that the set-up of the connection with the EMS Bubble, the secure EDI data platform and the PTC systems is extremely secure and reliable.

The transition should be complete by 15 September 2022.

The contractor should maintain accurate and updated documentation regarding the installation of the system, and provide complete documentation and instructions for migration to a new system provider.

2 Glossary

<i>Term or abbreviation</i>	<i>Definition</i>
Ad hoc groups	Groups of designated operators defined by the EMS Unit, differing from other groupings such as by region
Calendar days/ elapsed days	Number of days between two dates, i.e. the number of days to be added to the day <small>earliest date</small> to arrive at the day <small>latest date</small> . In the quarterly marketing reports, the number of calendar days is equal to Day(Delivery) – Day(EMA).
CAPE	Computer-aided post via EDI. This represents the suite of receptacle-level transactions i.e. PREDES, PRECON, CARDIT, RESDIT, RESCON and RESDES messages.
Delivery/ delivery date	The earliest of the EDH, EMH and EMI events.
Derived events	Events that are derived from an aggregation level. For example, the dispatch closed timestamp and the planned transport are derived from the PREDES transaction; the RESDES timestamp is derived from the receptacle scan captured by the operator to which the dispatch is addressed.
Direct link	When EMS items are inducted in the network by Operator A, addressed for delivery to Operator B, and Operator A manages the dispatch to Operator B, the Operator A to Operator B link is referred to as a “direct link”. See also “transit link”.
Dispatch	A selection of one or more receptacles belonging to a particular mail-category and mail-sub-class being sent from an office of exchange in one country to an office of exchange in another country. (Source: UPU M84 standard)
DO	Designated operator: a party designated by the government to deliver postal services in its country (see HBC – home base country). Designated operators are identified by means of an alpha-3 code assigned by the UPU, e.g. JPA.
E2E	See “end-to-end”.
e-Buyer Post	In e-commerce, the e-Buyer Post is the designated operator in the buyer’s country. The suffix of the S10 merchandise return solution (see “MRS”) identifier indicates the home base country of the e-Buyer Post.
e-Seller Post	In e-commerce, the e-Seller Post is the designated operator in the seller’s country.
EDI	Electronic data interchange
EDIFACT	Electronic data interchange for administration, commerce and trade.
EDI mailbox	The electronic address used by the DO and other parties, such as airlines and border agencies, to exchange EDI transactions. N.B. – There is currently no UPU code list linking an EDI mailbox owned by a postal party to its designated operator; the contractor shall ensure the implementation of a mechanism to link a party to an operator.
EDI reporting link	EDI reporting links are used in the calculation of statistics relative to timeliness and data compliance. An EDI reporting link is a combination of the DO/party sending EDI transactions and the DO/party to whom the EDI transactions are addressed. For EMSEVT EDI transactions, the EDI reporting link is further identified by the first character of the item prefix.
EDI transaction	Data that is exchanged in an electronic format, generally via a value-added network such as UPU POST*Net or Open Source (GXS). EDI transactions are exchanged between EDI mailboxes; an EDI mailbox belongs to a single party only. UPU code list 160 contains the link between EDI mailboxes and the owner party (as well as other information).
Elapsed days	See “calendar days”.

<i>Term or abbreviation</i>	<i>Definition</i>
EMS Bubble	The secured data storage platform housed by the PTC, which receives raw copies of all EDI data for EMS.
EMS Cooperative	A group of designated operators within the UPU that work together on operational, commercial, technical and economic matters concerning the EMS service.
EMSEVT – item events	Individual points in the postal operations pipeline. For example, “EMA” is posting.
EMS management team	The UPU EMS Unit. Members of the EMS management team have read access to the service performance statistics of all operators participating in the project.
EMS project group	A group of designated operators that induct or deliver EMS items in the network. Only operators that are members of the UPU EMS Cooperative can set aspects such as measurement rules, statistics, and report access and layout. Regional groups within the EMS project group may set different targets for all or specific statistics. Regional groups cannot change the rules governing how statistics are calculated. Regional groups may request additional reports or statistics.
End-to-end	The journey of an EMS item from posting (EMA) through to collection and delivery (EDH, EMH, EMI). End-to-end performance for EMS items is measured against standards and in calendar days.
ETOE	Extraterritorial office of exchange, i.e. an international mail processing centre (see “IMPC”) that is located in country that is not the home base country (see “HBC”) of the operator in question.
Export	See “leg 1”.
HBC	Home base country, indicated using the ISO alpha-2 country/territory code of the UPU designated operator, e.g. GB for UPU designated operator GBA.
i-Care	The EMS Cooperative's Internet-based inter-operator customer service system.
IMPC	International mail processing centre: facilities operated by designated operators to handle international mail. IMPCs can operate as an office of exchange (see “OE”), i.e. the origin/destination of international dispatches, and/or as a mail unit, i.e. the origin/destination of an international consignment. IMPC codes are maintained by the UPU and published under code list 108.
Import	See “leg 3”.
Item	The smallest unit of mail which can be uniquely identified. It is always ¹ transported in a receptacle and may have relationships to other classifying entities if the item can be classified more specifically than the receptacle that contains it. (Source: UPU M84 standard)
Item event	An event that is captured/registered at individual item level; item events are reported in EMSEVT EDI transactions.
Item lifetime	The period that must elapse before a given item ID can be reused to track events on the same reporting route for a new item. The S10 standard specifies 12 months.
ITMATT	A UPU message used to share information about the attributes of an item.
Leg 1	The transport stretch between EMA (posting/collection) and EMC (departure from the outward OE). Also referred to as “export”.
Leg 2	The transport stretch between EMC (departure from outward OE) and EMD (arrival at inward OE). Also referred to as “transport”.
Leg 3	The transport stretch between EMD (arrival at inward OE) and delivery. Also referred to as “import”.

¹ In situations with direct induction at a domestic sorting centre in the destination country, the dispatch process is bypassed and thus items are not transported in a receptacle.

<i>Term or abbreviation</i>	<i>Definition</i>
Mail class	An alpha-1 code that identifies the class of mail (letters, parcels, EMS, empty bags). See UPU code list 116 for the list of valid codes.
MRS	Merchandise return solution. MRS items are unwanted goods returned free of charge to their origin. These items bear an ID from the returning operator. For tracking and service performance purposes, the items should be measured against the defined standards for the product. However, these items are not included in the normal payment reports, but are processed according to the return arrangements between the e-Buyer Post and the e-Seller Post.
OE	Office of exchange: a facility that is the origin or the destination of an international dispatch. Office of exchange codes are maintained by the UPU and published under code list 108.
Official report	A report or set of reports requiring validation by the EMS Unit prior to publication.
Owner operator	For UPU S10 identifiers, the operator whose HBC matches the suffix of the item ID.
PTC	Postal Technology Centre of the UPU
QoS	Quality of service, based on measurement of the number of days or elapsed time between events.
Receptacle	A uniquely identifiable collection of one or more letters, packets, empty bags or items being transported together as part or all of a dispatch. (Source: UPU M84 standard). A receptacle is identified by means of a 29-character item ID/barcode.
Regional Coordinator	A member of the UPU EMS Unit, in charge of a group of operators participating in the project. Regional Coordinators have read access to the service performance statistics of each operator within the group.
Reporting link/ reporting route	A reporting link or reporting route identifies the elements that are used to correlate the information from various sources that apply to a given item. These elements are the origin operator (inductor), the origin country (country where the item is inducted in the network), the destination operator, and the destination country.
Return link	A link whereby an item is to be sent back to the origin operator, identified by means of EMSEVT events where the recipient of outbound events is the owner/origin operator.
RoT	Return of tracking. Measurement of the presence of an event against a selected event.
Time window	See “item lifetime”.
Tracked entity	An individual item or receptacle.
Transport	See “leg 2”.
Transit link	<p>Two scenarios exist:</p> <ol style="list-style-type: none"> EMS items are inducted in the network by Operator A, destined for delivery by Operator B. Operator A dispatches the item to Operator T for forwarding to Operator B. ⇒ <i>The Operator A to Operator B link is a transit link.</i> EMS items are received by Operator B but are not destined for delivery by Operator B; transit planned by the origin operator or the item has been misrouted at origin. Operator B forwards the item to Operator C. ⇒ <i>The Operator B to Operator C link is a transit link.</i> <p>See also “direct link”.</p>
VolRef	Volume of items.

3 Description of EMS SMART

3.1 General description

The EMS SMART online reporting system is fed by the EDI messages that are collected in the EMS Bubble data pool hosted by the UPU's PTC, as well as external reference data. The initial requirements that were used to build the system can be found in Annex 2. The system has been further developed since that time and is now more advanced, containing certain highly complex elements, such as the elapsed time calculator.

EMS SMART can be used on various devices, including desktop computers, tablets and smartphones. The screen is adjusted accordingly.

The EMS reporting system comprises several modules:

- EMS Calculation module: calculation of performance on selected tracked entities and EDI transmission;
- EMS Statistics repository: filing of aggregated statistics;
- Online reporting tool: statistics from the EMS Statistics repository are grouped into reports and either published online or made available via a reporting hub. Using the online display, it is possible to drill down to individual entities.

EMS SMART is currently updated twice per day with new data arriving from the EMS Bubble, with calculations performed with each data update in order to refresh the daily view. It may be necessary to add further updates if capacity allows. The minimum requirement is twice per day. The statistics are presented for the last 45 days, for the last six weeks on a day-by-day basis, and for the last 15 months, with the figures for each month being added once the statistics have been frozen following the monthly calculation.

The sets of statistics (presented in dashboards and Excel reports) are versioned. Data versions are stored and the reports can be rerun if errors are discovered (e.g. missing reference data). The contractor should be prepared for this to occur on an occasional basis.

3.2 Cockpits and dashboards

EMS SMART has four cockpits that display sets of indicators on the same screen with performance for the last 10 days, and 14 thematic dashboards with 321 calculated indicators. These can be accessed through the horizontal menu and a vertical menu on the left-hand side.

The four cockpits relate to service performance, data quality, service information and awards compliance.

The 14 dashboards relate to export, transport, delivery, end-to-end performance, transmission timeliness, ratios, M40 compliance, end-to-end elapsed time, end-to-end zone 1 to zone 1, service information, time in customs, volumes, returns and transit. Users can choose to view the results on the dashboards as numbers and as percentages, for inbound or outbound performance for most indicators. Most dashboards offer the option to display compliant and non-compliant performance figures based on the user selection. For example, separating on-time and late items makes it easier to investigate irregularities.

The awards compliance cockpit is calculated for two years simultaneously during the first quarter of each year, with the earlier year subsequently being removed. The indicators for this cockpit are calculated for the year to date and are linked with the respective dashboards.

Screenshots of the cockpits and dashboards, as well as a list of indicators currently calculated, can be found in Annex 3.

The aim of the dashboards is to give users an indication of where they stand with regard to the targets set in the different programmes of the EMS Cooperative:

- The user can select inbound or outbound traffic, as well as positive/compliant or negative/non-compliant results.

- Members have access only to statistics concerning their own traffic or the traffic that they have delivered. Superusers have access to all statistics. Several user roles exist, with varying privileges and access rights. A more detailed description is provided in the single sign-on section.
- The EMS SMART online reporting module presents performance as calculated at the day/time of cut-off for report generation.
- From the dashboard, users can drill down to different levels of detail (e.g. outward OE, day of arrival) for individual items. Users can also download the diagnostic flat files and, in most cases, where the number of items does not exceed 100, they can track and trace items directly from the dashboard with one click.
- In the EMS SMART online reporting module, the results of certain indicators for the current month can be presented with a note or indication that the results are not yet final.
- The statistics presented in the monitoring module may be calculated on the basis of a different selection of items than for the reporting module, e.g. the EMA over EMC ratio in the reporting module may be calculated on the basis of traffic delivered at destination. In the monitoring module, the aim is to identify issues in capturing and/or transmitting the EMC event as quickly as possible, hence the statistics may be calculated on the basis of items which received an EMA event.
- There is a set of calculation rules for each indicator. If the same indicator is reused, the same calculation rules are used for that indicator.
- For data sourced from external parties, daily or weekly updates are not anticipated; such data will be updated monthly at the most.

There is also an elapsed time calculator tool, which calculates the elapsed time between EMSEVT events and some CAPE events, in various combinations, between one and a selection of operators, on request. The tool performs complex matches between items and receptacle information, with the results presented in Excel reports. There are special rules for the reports run and storage by operators/users.

All dashboards allow for the extraction of data in Excel format and for the presentation of data as numbers or percentages, as well as in a graphical view. The graphs can also be extracted.

3.3 *Types of measurement*

Service performance against standards

To calculate performance against defined standards for export, transport and delivery, EMS SMART takes into account the calculation rules specified by the EMS Unit, the service standards tables prepared by the EMS Unit, non-working days (i.e. public holidays and weekends), and zones affected by force majeure. All of this information is constantly synchronized from the EMS Operational Guide. Calculations are performed individually for each operator for each link, as well as globally.

The EMS reporting system collates information relative to tracked entities according to the rules fixed by the EMS Unit. For example, Operator A sends events EMA, EMB and EMC to Operator B; Operator B does not send an EMD event, but one EMD event is sent by Operator C to Operator A. The EMD event sent by Operator C is filtered out when measuring the EMD/EMC statistics for Operator B.

The EMS reporting system can collect from the EDI repository the time at which specific events selected for measurement were posted on the EDI network.

The performance results show on-time and late results, as well as various anomalies.

The same type of measurement is conducted for end-to-end performance, but includes a prioritized order of anomalies.

Transmission timeliness

- For the measurement of transmission timeliness, the tracked entities may be a message, an event tag or a receptacle. There is no assembly step.
- The EMS reporting system selects the EDI messages according to the rules set by the EMS Unit.

- The EMS reporting system can filter out specific occurrences, e.g. retransmission of older information, multiple RESDES messages for the same receptacle.
- For EMSEVT messages, the network timestamp is passed on to any event found in the message.
- For PREDES, PRECON and CARDIT messages, the network timestamp is assigned to the dispatch or consignment ID.
- For RESDES and RESCON messages, the network timestamp is passed on to any receptacle in the response message.
- The information about calculated entities will remain accessible for a period as defined by the EMS Unit. Information is used to support drill-down to entity level in the online reporting module or to recalculate performance to cater for exceptional situations such as force majeure.

M40 compliance

EMS SMART compares transmitted EDI messages against a subset of rules from the UPU M40 messaging standard, taking into account all message technical data elements.

Other calculations

Other calculations include a comparison of the number of events transmitted by operators over a period with other events for the same items, e.g. the number of EMD events over EMC. This type of calculation requires the system to find all information relating to the same item and to apply a complex set of rules. The most complex calculations concern return and transit events, as one item can have several different origin and transit operators, including return routes.

Certain reports serve as a basis for international accounting worldwide and therefore need to be correct at all times.

Many measurements are also used for the worldwide EMS Cooperative performance awards programme.

Certain measurements may need to be repeated and recalculated if specific situations occur.

The detailed calculation rules are the intellectual property of the UPU. They are recorded and can be provided only to the selected supplier.

3.4 EMS SMART statistics repository

The statistics repository is the core of the EMS reporting system. It holds volume information derived from the calculated entities in the calculations layer, e.g. Operator A sent x EMA events to Operator B on day dd/mm; y out of the x items received an EMC event.

The SMART statistics are aggregated at different levels, e.g. operator, region, membership during publication. Owing to the central repository, drill-down functionalities can be offered through the online application with regard to statistics calculated locally in the EMS reporting environment:

- The EMS reporting system can flag certain items for exclusion from or inclusion in specific reports. For example, merchandise returns (unwanted goods) bear an item ID compliant with the identifiers used by the e-Buyer Post. These items are kept in the service performance report (measurement against standards), but are filtered out from the payment reports and instead included in a dedicated payment report.
- More than one set of statistics may be derived from the calculated entity records.
- Statistics provided by external service providers are converted into a compatible format for storage in the repository.
- The EMS statistics repository can freeze identified statistics from updates.
- Statistics in the central EMS statistics repository may be subject to validation by the EMS Unit prior to publication in the online application.
- For official reports, the EMS statistics repository holds only one validated occurrence of a set of statistics per defined period.

- Each set of statistics is uniquely identified in the EMS statistics repository.
- The EMS Unit may ask for simulation reports, e.g. a rerun of previously calculated statistics in order to confirm that a particular issue has been resolved or to estimate impact on service performance following a review of the delivery standards. These statistics are accessible only by the EMS Unit via the online application and will not be used in official reports.

3.5 Other functionalities of SMART

EMS SMART also offers the following functionalities.

3.5.1 Reporting hub

The reporting hub is a download centre, where files are published for individual operators and for the EMS Unit. It also includes a report generator tool.

- Once the EMS Unit has validated the statistics, the EMS reporting system can generate the requested reports in Excel, together with the supporting diagnostic file, for publication in the reporting hub.
- The report generator allows superusers to select a report type, a period, a run date, and the periodicity, and to generate reports for all operators.
- Access to specific reports may be subject to authorization.
- Members of the EMS Unit are able to download, for a given period and instruction, all reports and diagnostic files for a single operator, for all operators in a region, or for all operators.
- The names of the folders in the reporting hub indicate the period covered by the reports and the production data.

3.5.2 Tracking module

This functionality provides online tracking and tracing of receptacles and items. It allows users to track multiple items at the same time. The dashboards offer a direct link to the tracking module. Tracking shows all events for items and receptacles available in the EMS Bubble in a user-friendly display with colours, listed in chronological order, including the mailboxes/EDI addresses that transmitted the data, location, destination country as per the EDI message, reason codes, action codes, flight details and other message details as specified, extracted from the messages where required. There is a separate tab with a timeline view offering details of each event, and a special view showing a complete EDI file containing the scan with properties and contents.

3.5.3 Tools menu

The **tools** menu offers the following functions: activity audit, usage statistics, alert subscriptions and notification.

Activity audit – provides the EMS Unit with access to all activities in the system. Users can select the period, type, action, user, operator, context and description. The results can be downloaded in Excel format.

Usage statistics – allows users to run an Excel report with aggregated usage statistics for a desired period. The report can be sent by e-mail to the user.

Alert subscriptions – allows users to set up their own alert criteria and receive alerts by e-mail. When a new set of monitoring statistics is calculated, the EMS reporting system can launch a comparison against current performance and performance over a past period, and notify the subscribed users. The subscription can be set for a daily and weekly periodicity for a selected number of indicators. The thresholds can be left as those defined by default or set up by each user separately for each indicator. A special subscription to access the results of several operators is possible for certain types of user.

			EMS Defaults		Subscription Defaults	
Performance Indicator	Enabled		Threshold	Incl. Blanks	Threshold	Incl. Blanks
▼ Outbound Export (0/11 enabled)						
On-time	No	<	95.0%	Yes	95.0%	Yes
1 day late	No	>	5.0%		5.0%	

Notification – allows users to create pop-up messages for all SMART users with announcements that are valid for a period of time.

3.5.4 Synchronization

This module allows users to synchronize the following types of reference data with EMS SMART:

- Validated export, transport and delivery standards;
- Operational Guide questionnaires containing public holidays, non-working days, etc.

3.5.5 Reference data

This module includes the following sections: operator, force majeure, code lists, statistic versions and alert EMS defaults. This module is available to superusers only.

Each set of reference data has an associated validity period (e.g. operator X is in test mode until February 2017; as of February 2017, operator X is in full production mode).

EMS SMART is required to support updates to any reference data.

EMS SMART is required to make use of the most recent version of the UPU code lists. However, in the event of recalculations, the version to be used must be that applicable to the period covered by the report.

EMS SMART is able to give read access to the reference data through the online reporting tool.

Further details of the sections are as follows.

Operator

This section includes an overview, per operator, of:

- EDI profile:
 - The operator's EDI mailboxes and the message versions that it can exchange from UPU code list 160a;
 - Network used;
 - The IMPCs used by the operator from UPU code list 108.

It also includes operator details, such as the territory time zone used, operator code, party identifier, country, region, membership status, tracking status, participation in the Pay-for-Performance Plan with the number of agreements and a list of partners, information on signature of the Pay-for-Performance Multilateral Agreement, validation of export, transport and delivery standards, and national holidays, synchronized with and/or drawn from the EMS Operational Guide.

Force majeure

As needed, this interface allows superusers to add cases of force majeure per operator and per leg, as well as zones affected by force majeure and other relevant information. This information is used in the calculation of service performance. The interface also provides an overview of open and closed cases.

Code lists

This section allows superusers to upload Excel files with information that is then displayed in the operator profile. Other reference data tables and the external file with performance figures, such as i-Care results, are uploaded to SMART in this section. The UPU code lists are also uploaded via this module.

Statistic versions

This tool is used to freeze the statistic versions, run calculation jobs and publish the monthly dashboard results. This is the source of the data used to generate Excel reports for the reporting hub.

Alert EMS defaults

This section is used to set up the default values per indicator for the daily and weekly alerts subscription tool. Indicators can be edited. The module also allows users to create a text message that is sent in the e-mail with the attached alert in the form of an Excel file.

3.6 External links menu

This menu includes two sections: the education hub and external links. The education hub includes links to the EMS reports guide on the EMS Cooperative website, and to training videos published on YouTube.

The external links section contains links to the main pages of the EMS Cooperative website and the EMS Operational Guide, a contact link that creates an e-mail to a specific address, and links to the disclaimer and confidentiality statements published on the EMS Cooperative website. The contractor will be expected to add and remove links, and to add other sections if necessary.

3.7 Access levels

EMS SMART offers different levels of access to different sections. Each type of role has a set of defined privileges. Each user is assigned a role under EMS Operational Guide user management, and the same credentials are used for single sign-on to all EMS tools.

3.8 SMART – Integration platform

The system comprises a test platform that is a copy of the production environment, allowing users to test all developments before implementation. It is also connected with the test platform of the EMS Operational Guide. These integration systems must be provided by the contractor and included in the hosting and maintenance services.

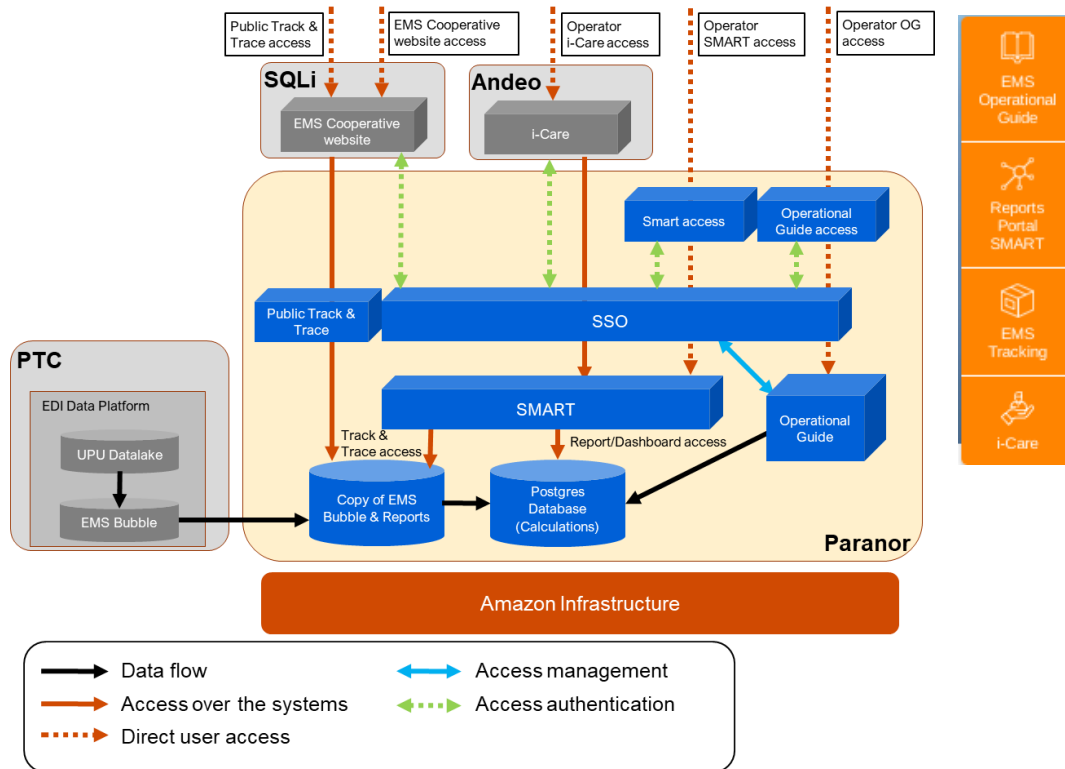
3.9 Side bar

EMS SMART includes a side bar with four buttons that appears both in the EMS Operational Guide and on the EMS SMART platform. This side bar uses the single sign-on solution, and allows direct and easy navigation between the applications that are connected by this system.

In both systems, the EMS side bar consists of a right-aligned toolbar that allows users to navigate as follows:

- From the EMS Operational Guide to:
 - The EMS website
 - EMS SMART
 - EMS tracking
 - EMS i-Care

- From EMS SMART to:
 - The EMS website
 - The EMS Operational Guide
 - EMS tracking
 - EMS i-Care



All users see all navigation buttons within the side bar, including those for applications to which they have not been granted access. The buttons are collapsed and expand when hovered over. The contractor shall maintain this side bar.

4 Technical details of EMS SMART

Data is managed in a structured form in high-performance databases in order to provide all of the required services without unnecessary redundancy and with an integrated SSO and user management service.

Item data is obtained by replicating the database hosted by the PTC (i.e. the EMS Bubble) on an hourly basis, through a VPN tunnel. Based on information from the database and from the Operational Guide, performance calculations are conducted twice per day. Fixed report generation and additional dashboard value calculations occur monthly, and certain reports are calculated quarterly and annually. Reports are made available to the EMS Unit and to operators through the SMART reporting hub. Information on single items and events – track and trace – can be retrieved from the database through i-Care, the EMS Cooperative website or SMART.

Raw item data, copied from the EMS Bubble, and reports are stored in the Hadoop database, while aggregated data, produced from the raw data, is available in the Postgres database. Reports generated from the aggregated data are stored in the Hadoop file system. Users accessing information (item, report or dashboard) via SMART are routed seamlessly to the correct database.

Main technologies used for EMS SMART

- Back-end technology
 - Java 8
 - Hadoop (MapReduce, HDFS, Yarn, ZooKeeper, etc.)
 - HBase
 - Postgres
 - H2 database
 - Redis
 - Liquibase
 - Apache Flink
 - Apache POI
 - Spring Boot
 - Spring MVC
 - Spring Security
 - Spring Data (JPA + Hibernate)
- Front-end technology (user interface)
 - JavaScript
 - ReactJS
 - React Redux
 - React-Bootstrap
 - AG Grid
- Development tools/test tools/quality assurance
 - Webpack
 - Apache Maven
 - ESLint
 - Checkstyle
 - SpotBugs
 - Docker
 - Hadoop MiniCluster
 - Mockito
 - JUnit

5 Description of the EMS Operational Guide and single sign-on

The EMS Operational Guide is an important online publication produced by the UPU, containing information on the EMS services offered by postal organizations. The entry of each EMS operator provides information on the scope of their service and all operational aspects of their incoming EMS service. The Operational Guide is designed as a working tool for EMS operators to consult and obtain information on the conditions under which the EMS product is delivered by their partners.

The EMS Operational Guide database is designed to store and display this information on the web (text in a question/answer format, web links, information tables, information in Excel and PDF format, jpeg files) and to serve as a source to produce the necessary glossaries for each operator's needs. It allows online data entry by DOs, which is then validated and published by the EMS Unit. There is also a function to extract various types of information, including queries and reports, and a transit time calculator.

The EMS Operational Guide also contains important information on export, transport and delivery standards, which serves as reference data for calculations in SMART and as a basis for the transit time calculator. The EMS Operational Guide also offers the functionality to communicate with EMS Cooperative members on the standards validation process, and to collect and publish information. The process description can be found in Annex 4.

The EMS Operational Guide feeds EMS SMART with service standards, non-working days, public holidays, OE working days and other operator details. Similarly, it also feeds EMS i-Care with certain operator details.

The EMS Operational Guide also includes an e-mail function, as well as a status change notification function.

The EMS Operational Guide is published in English, French, Spanish, Portuguese and Russian, with translation provided by the UPU. The contents of the current questionnaire can be found in Annex 5.

One of the requirements for this application is support for various devices, including desktop computers, tablets and smartphones. It is designed to work not only with the most common browsers and popular operating systems, but also to be available via modern mobile devices. Thus, it uses a fluid layout that automatically adjusts the page size to monitor resolution settings, including for small screens.

The current version of the EMS Operational Guide database, which was finalized in 2009 using MS SQL technology, stores and presents data in an online format, as well as in an extractable format for printing or download, which is currently made possible by means of a PDF/Excel/Word reporting function.

The entire database is password protected and available only to EMS Unit staff, technical administrators and DO representatives. There are several active user groups with different levels of access. Firstly, there are EMS Unit superusers, who can validate, edit and publish data. Secondly, there are editors, who are DO representatives and, finally, all other users of the database with read-only access, who are also DO representatives. There are other roles for standards validation. All roles are listed in the single sign-on section below. EMS Unit staff have access to additional entry maintenance tools, plus an audit trail feature, and a tool to modify the website static text labels.

There is the same side bar as in EMS SMART, allowing easy transition between EMS SMART, the EMS Cooperative website, EMS tracking on the website, the EMS Operational Guide and the i-Care system.

The Operational Guide screen contains a menu with several tabs: contents, requests, queries, calculator and standards administration. The landing page for superusers also contains a summary of all requests. This is a page from the "Requests" menu and serves as a cockpit for EMS Unit staff. The screen also contains a drop-down list to select operators/regions, a "Subscribe" button, a help section, access to the profile of a logged-in individual, the option to switch between languages, a notifications sign, and a side bar. For viewers, the landing page is the questionnaire of the operator to which the user is assigned.

The **Contents** tab contains the questionnaire for a selected operator.

The **Requests** tab provides access to requests regarding questionnaires, delivery, export and transport standards, and the postcodes module. Delivery and export standards summarize requests and the status thereof with regard to the corresponding standard validations, while transport standards list the status of transport standard validations. The postcodes section allows users to upload and modify the postcodes that feed the transit time calculator.

The **Queries** tab provides access to preset queries, flexible queries, questionnaire changes and credit for the EMS Operational Guide update summary.

At present, there is one flexible query, which enables users to select the information that they wish to see in the report by ticking the respective boxes prior to generating the report. There are also preset queries, as follows:

- Call centre to customers
- Call centre to operators
- Countries with prohibited articles in addition to the UPU list
- Delivery rates
- Delivery standards for selected operators
- Export standards for selected operators
- Holidays
- List of operators that changed their delivery rates within a given period
- List of operators that changed their delivery standards within a given period
- List of operators that changed their export standards within a given period
- Multilateral agreement and date of application
- Non-delivery days
- Offices of exchange
- Operational contacts
- Operators offering à découvert service
- Operators which do not cover the entire country
- Operators with special size or weight limits, different from the general terms
- Operators with track and trace websites
- Threshold exempt from customs duty

Examples of queries are provided in Annex 5. The reports can be displayed on the screen, or exported to Word, two types of Excel file and PDF, or sent by e-mail. Users can subscribe to receive the results of a query by e-mail on a regular basis. EMS Unit staff with superuser role can modify the content of queries and delete queries. The contractor will be expected to modify, adjust and create new queries upon request.

The **Questionnaire changes** section allows users to view all changes made to the questionnaires, and to run a report on changes made by specific operators between certain dates.

Credit for EMS Operational Guide updates allows users to see which operators updated the Operational Guide during which quarter. It is possible to select the region, operator, start date, end date and quarterly indicator prior to running the report.

The **Calculator** tab provides access to a complex tool that calculates the transit time between posting and delivery, based on the date and time of posting. It is possible to select the origin and destination operators, origin and destination OEs (if available), origin and destination zones, and origin and destination postcodes. The export, delivery and transport standards must be validated and published in the EMS Operational Guide in order for the calculations to be performed. Calculation on the basis of postcodes is possible if postcodes are available in the system for both operators.

The results list possible combinations on a given day and take into account other reference data published in the questionnaires, such as non-delivery days, public holidays and cut-off times. It calculates the number of days for export, transport, delivery, and overall total. Currently, in the absence of validated transport standards, the default predefined transport intercontinental standards are used in the calculation.

Calculator

Date *2021-07-12Time *14:31

From Operator *Select...Value is mandatory

To Operator *Select...Value is mandatory

From OEsSelect...

To OEsSelect...

From ZonesSelect...

To ZonesSelect...

From Post Code

To Post Code

Calculate

From OE #From Zone #To OE #To Zone #Validated Leg 2 #Export (Days)#Transport (Days)#Delivery (Days)#Total (Days)#Delivery Date #

There is no data to display

The **Standards** tab contains a drop-down list with delivery, export and transport standards, transport regions and postcodes. This section allows users to view all details for a selected operator with regard to the corresponding performance standards.

Standards ▾Adminis

Delivery Standards

Export Standards

Transport Regions

Transport Standards

Post Codes

— Currently Validated — Delivery standards revalidation v2.0

1 Offices of Exchange

1.1 Validated delivery standardsYes

Date of last update2017-09-05

1.2 Custom clearance average time for

Items subject to duty2 Hours

Items not subject to duty1 Hours

Comments—

1.3 Use delivery office codes in calculatorNo

2 Measurement Table

2.1 Version of Measurement Table2

2.2 Date2018-02-05

2.3 To be applied from04 2018

2.4 Remote customs applyNo

3 Days of the week on which EMS items are delivered

Day #Monday

The **Transport regions** section shows the default transport standards between the regions set for use by the transit time calculator, in cases where the transport standards are not validated. Superusers can edit these standards. The postcodes section lists the published postcodes per operator, if available. It also includes an editing menu for superusers.

EditPrefillNew RequestView HistoryVersion ▾Post Codes ▾Download ▾?☰

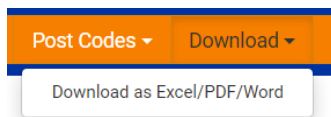
ew HistoryVersion ▾Post Codes ▾D

Upload Export Post Codes from Excel

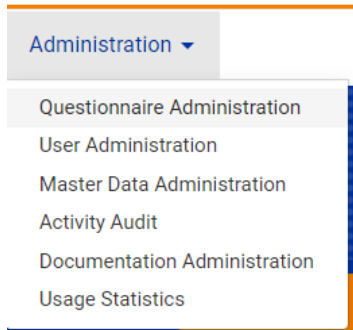
Download Export Post Codes to Excel

Upload Delivery Post Codes from Excel

Download Delivery Post Codes to Excel

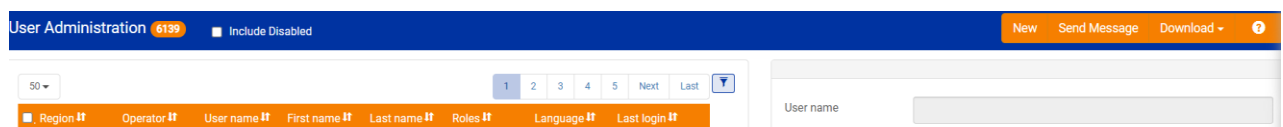


The **Administration** tab provides access to several administrative functions for superusers.



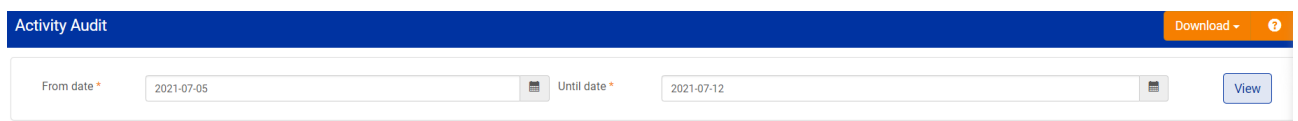
The **Questionnaire administration** section is dedicated to the schema of the questionnaire.

The **User administration** tool serves for the creation of new users, editing of existing users, and assignment of roles. All users from all applications using the single sign-on function are included in this list. Currently, the database contains more than 6000 users. A number of filters are available for sorting purposes, and there are password reset and e-mail functions.



The **Master data administration** section includes a drop-down list with types of master data that can be edited through this function.

The **Activity audit** function records and displays all user activities in the EMS Operational Guide on request.

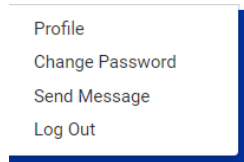


The **Documentation administration** function allows superusers to add and store documents in the system by topic. This relates essentially to explanations of functions and instructions on specific processes.



The **Usage statistics** section allows users to select a period of time and run an Excel report with certain aggregated usage statistics. The report is sent to the user by e-mail.

The **Profile** tab includes information on the user profile, including role, user name, user details, subscription to queries and workflow changes. The **Change password** section allows users to change their password, and the **Send message** function allows superusers to send messages to all EMS Cooperative application users by user name or role. This menu also contains the **Log out** button.



Single sign-on

The CAS server-based single sign-on system is implemented and configured for the EMS Operational Guide, EMS SMART, i-Care and the EMS Cooperative website. All roles and privileges are defined and integrated as part of the EMS Operational Guide database, and are managed as part of the EMS Operational Guide application (master data for roles and privileges, assigning roles to users, etc.). The passwords are encrypted. Currently, there are around 6000 users registered in the database, most of whom have multiple roles. New users can be created directly in the database and also via requests submitted through online forms. For i-Care, new users should be validated by the managers, and a special verification process exists to this end. New users receive a link in order to set up their own password.

Twenty-five user roles for all EMS systems are defined for single sign-on, as follows:

EMS Cooperative website (5)

EMS Administrator
 EMS Cooperative Member
 EMS IB Staff
 EMS Stakeholder
 EMS Unit Board

EMS Operational Guide (8)

Editor
 EMS Site Viewer
 EMS Unit Contact Person
 Retroactive questionnaire holiday changes
 Standards Manager
 Superuser
 Technical Administrator
 Viewer

EMS SMART (7)

SMART Regional Viewer
 SMART Regional Coordinator
 SMART Superuser
 SMART Synchronizer Process
 SMART Technical Administrator
 SMART Tester
 SMART User

i-Care (5)

i-Care Call Centre Agent
 i-Care Call Centre Manager
 i-Care Master User
 i-Care Operational User
 i-Care Synchronizer Process

6 Technical details of the EMS Operational Guide and single sign-on

The following technologies are used in the EMS Operational Guide and single sign-on.

- Back-end technology
 - Java 8
 - Mongo
 - Apache POI
 - Jasper Dynamic Reports
 - Spring Boot
 - Spring MVC
 - Spring Security
- Front-end technology (user interface)
 - JavaScript
 - ReactJS
 - React Redux
 - React-Bootstrap
 - React-Bootstrap-Table
- Development tools/test tools/quality insurance
 - Webpack
 - Apache Maven
 - ESLint
 - Checkstyle
 - SpotBugs
 - Mockito
 - JUnit
- Single sign-on server
 - Apereo CAS Enterprise Single Sign-On

7 Public track and trace

The EMS Cooperative website (www.ems.post) offers a track-and-trace feature available to the public. EMS SMART retrieves events from the EMS Bubble and feeds the track-and-trace function. The function is built on the Amazon Web Services cloud infrastructure. The public track-and-trace service displays a defined set of events and data elements with translation into customer-friendly language. Certain restrictions exist regarding the display of available tracking data, depending on the operator. The results can be displayed in English, French, Spanish and Portuguese. Around 16 million items are tracked per year by users from all over the world and usage is constantly increasing.

8 Connection with the i-Care system

The EMS Cooperative's customer care system is fed with reference data from the EMS Operational Guide. It also accesses the user database, and pulls track-and-trace information. Therefore, a dedicated interface has been built between EMS SMART, the EMS Operational Guide and i-Care. A read-only i-Care interface to the EMS Operational guide (www.emsog.post) gathers the following information:

- list of operators, countries and regions in the system (i.e. the corresponding master data lists);

- each operator's details (corresponding to section 1 of the EMS Operational Guide questionnaire);
- national holidays per operator (section 2.5 of the EMS Operational Guide questionnaire);
- list of all users that have i-Care roles, per operator.

The endpoints of the Operational Guide are accessible only to authenticated technical users.

The track-and-trace service for EMS items is available using REST, whose responses will be JSON objects. These objects are already structured and transformed to the EDI data platform format, so that they can be easily interpreted by i-Care.

The track-and-trace information consists of the items and dispatch events, along with certain extra information, defined in the EDI standards. i-Care makes no further use of mapping for its queries.