A COMPUTER-IMPLEMENTED METHOD AND SYSTEM FOR SHARING INFORMATION BETWEEN PASSENGERS AND AIR TRAFFIC MANAGEMENT STAKEHOLDERS

FIELD

The present disclosure is comprised in the field of telecommunication involving flight passengers. In particular, it relates to securely exchanging information via System Wide Information Management (SWIM).

BACKGROUND

It is observed that there is very limited real-time communication between passengers and airlines which can provide high benefits to both parties.

Some third party companies currently offer limited access to flight information to passengers. For instance, some uncertainty parameters influence the accuracy of departure and arrival data provided to the passengers. As a result, available information comprises purely estimated times of arrival and departure, and it is not particularized to passengers' status. There is reduced information exchange before, during and after the flight. This is undesirable, especially when passengers are connecting flights from different operators. This reduced access to information and limited customization often results in ineffective assistance to passengers.

A need thus exists for improving passengers' experience by offering services customized to his location and situation using shared flight-related information. Therefore, an enhanced assistance may be provided to passengers to help them in case of incident, connection lost, baggage claim, and the like.

On the other side, airlines and Air Navigation Service Providers (ANSP) can also take advantage from this communication channel. Information generated by or obtained from passengers' devices may be used as an additional source of information. It may be useful to verify a particular event or enhance the description of a situation (e.g. an emergency).

SUMMARY

Generally speaking, the present disclosure relates to a system and a method that enable real-time communication between passengers and SWIM infrastructure from door to door.

In one example, a system for providing passenger information includes a passenger electronic device and a managing unit. The passenger electronic device is configured to send at least personal data, device geolocation and device time-stamp information. The managing unit is configured to obtain the passenger itinerary and to confirm passenger identity based upon a match between the personal data, passenger electronic device geolocation and time-stamp, and information contained in the obtained passenger itinerary. The managing unit is further configured to access to updated air traffic information relevant to the passenger upon confirming the passenger identity and to send a passenger report comprising flight status information for display on the passenger electronic device.

In another example, a computer-implemented method for providing passenger information includes sending, to a passenger electronic device, at least personal data, device geolocation and device time-stamp information; obtaining the passenger itinerary and confirming passenger identity, by a managing unit, based upon a match between the personal data, passenger electronic device geolocation and time-stamp, and information contained in the obtained passenger itinerary; and accessing to updated air traffic information relevant to the passenger upon confirming the passenger identity and sending, by the managing unit, a passenger report comprising flight status information for display on the passenger electronic device.

A real-time-connection service-oriented architecture can be implemented to share information between passengers' electronic devices and SWIM infrastructure. To that purpose the present disclosure makes use of System Wide Information Management (SWIM). SWIM includes standards, infrastructure and governance enabling the management and exchange of Air Traffic Management (ATM) related information.

Currently, ATM information is available via SWIM to several stakeholders: aircraft, airports, air traffic controllers and air navigation service providers, airline operation centers, military operation centers, flow management centers and weather service providers. However, at present, the passengers cannot connect to SWIM infrastructure by any means.

It is therefore an aspect of the present disclosure to provide an infrastructure for Passengers Access to SWIM (PAtS), in which access may be in a bidirectional way.

The proposed system and method may enable downlink and uplink of tailored, digital information from and to passengers' electronic devices using a dedicated interface to the SWIM infrastructure upon validating passenger identity.

It is another aspect of the present disclosure to increase or improve the overall functionalities of SWIM by using information from passengers using their electronic devices.

The services and information offered or available through the passenger access device may be based upon the passengers' device identifier (if available), geolocation, itinerary, and other time and location data.

One of the common difficulties associated with providing information to passengers on

specific services is being able to locate relevant information according to the passenger's current location.

It is a further aspect of the present disclosure to provide information based on itinerary. The itinerary may include the passenger name or other identifying information, the time and location of updated key events including aircraft boarding, departure, landing, and de-boarding, as well as itinerary changes requested by the passenger and those caused by airline and air-traffic events (e.g. delays, diversions, and cancelations.)

In one example, a system for providing passenger information includes a passenger electronic device and a managing unit. The passenger electronic device is configured to send at least personal data, device geolocation and device time-stamp information. The managing unit is configured to obtain a passenger itinerary and to confirm a passenger identity based upon a match between the personal data, device geolocation and device time-stamp information received from the passenger electronic device, and information contained in the passenger itinerary. The managing unit further is configured to access updated air traffic information relevant to the passenger at a System Wide Information Management (SWIM) infrastructure upon confirming the passenger identity, and to generate and send a passenger report comprising flight status information to the passenger electronic device for display on the passenger electronic device.

In another example, a computer-implemented method for providing passenger information includes receiving, from a passenger electronic device, at least personal data, device geolocation and device time-stamp information; obtaining a passenger itinerary and confirming a passenger identity, by a managing unit, based upon a match between the personal data, device geolocation and device time-stamp information received from the passenger electronic device, and information contained in the passenger itinerary; accessing updated air traffic information relevant to the passenger at a System Wide Information Management (SWIM) infrastructure upon confirming the passenger identity; and generating and sending, by the managing unit, a passenger report comprising flight status information to the passenger electronic device for display on the passenger electronic device.

Further objects and advantages of the present invention will be apparent from the following description, reference being made to the accompanying drawings wherein preferred embodiments of the invention are clearly illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

A series of drawings which aid in better understanding the disclosure and which are presented as non-limiting examples and are very briefly described below.

Fig. 1 schematically shows passengers' connectivity to SWIM infrastructure.

Fig. 2 schematically shows Passenger Management System (PMS) design.

Fig. 3 shows a block diagram.

DETAILED DESCRIPTION

By enabling passengers' access to SWIM, a bidirectional communication is established. Valuable information may be exchanged between passengers and SWIM stakeholders. SWIM information may be enriched from passengers' information and passengers may benefit from the access to the SWIM information.

Although the list of possible feature is almost unlimited, next list gathers a preliminary set of main features that may be implemented in the Passengers Access to SWIM (PAtS):

- Passenger no-show information sharing.
- Passenger baggage and weight information can be shared before check-in.
- Passenger position in the airport, useful for instance in case of gate change.
- Electronic Individual Last call.

- Exploitation of passengers' GPS geolocation enabled by mobile devices.
- Real time updated information about flight connections.
- Optimization of flight connections based on real time flight status.
- Overall system optimization due to passenger geolocation monitoring.
- Security. Hijacking report by passengers onboard.

FIG. 1 shows how the passengers get access to the SWIM network by using different protocols through the Passenger Management System **132** (PMS).

- Home PAtS **102**: The passengers' connection to the IP network can be obtained through a wired/wireless access point at home or through a LTE network **122** access point.

- Airport PAtS **104**: Passengers at the airport. The connection to the IP network can be obtained through the Airport wireless network **112** or through a LTE network **122** access point.

- Gate PAtS **106**: Passengers at the boarding gate or onboard (airplane at the platform). The connection to the IP network can be obtained through a LTE network **122** access point or through a gatelink **128**, that is a wireless communication link for on-ground aircraft wireless communication (e.g. according to standard ARINC 822).

- Airborne PAtS **108**: Passengers are onboard and the connection to the IP network can be obtained through the cabin wireless Local Area Network **118** by means of the Inflight Entertainment System (IFE) **119** or the passengers' electronic device **110**.

The passenger electronic device **110** may be a desktop computer, laptop computer, tablet, cell phone, in-flight entertainment unit or other network enabled device.

In order to offer a proper protection for SWIM sensitive information, operations and SWIM stakeholders, the passenger's connection to SWIM needs to be controlled and restricted. To this end, a Passenger Management System (PMS) **132** provides an interface that defines and establishes connections between the passenger and the SWIM infrastructure **134**, assuring security, permission grant management and

boundary protection by decoupling the SWIM network from the IP network used by the passengers.

The PMS **132** has the capability of connecting a passenger's electronic device **110** with multiple SWIM infrastructures as depicted in FIG. 1. Among others, infrastructures such as Meteorological Service Providers **136**, Military Operations Center **138**, Air Traffic Control (ATC) **140**, Airline Operation Center **142**, Airport & Handling Systems **144** and Flow Management System **146**.

On the other hand, the PMS **132** publishes passengers' data which may be exploited by dedicated SWIM agents. The PMS **132** may provide such information to the SWIM infrastructure.

Establishing a bidirectional information flow provides an unprecedented capability which enables multiple out-of-the-box functionalities to any SWIM stakeholder.

FIG. 2 depicts a proposed design of the PMS **132**. The main defined interfaces are:

- Passenger Security Layer **202**: Passenger secured (signed and encrypted) information with encapsulated service call request/reply.
- Service Layer **204**: Particular request/reply service, including passenger's information or SWIM information tailored to the passenger's requirements. Any possible service (Service 1, 2, ..., S) is required to match the software implementation of system features. Possible services are shown below:
    - Passenger no-show information service.
    - Passenger baggage and weight information service.
    - Passenger position at airport sharing service.
    - Electronic Last call service.
    - Position calculated using GPS enabled mobile device management

service.

- Flight connections service.
- Flight status service.

- Managing Unit **206**: Main algorithmic used for managing the passenger requests or the SWIM queries, by capturing, storing and processing the data available through the bidirectional flow of information. The Managing Unit **206** merges and fuses information from different SWIM implementations to provide the passenger with the expected information. The accessibility to the information is transparent to the end user, although internally the PMS **132** requires managing information from different sources.
- SWIM Security Layer **212**: Implements encryption and signing algorithms needed to secure requests for a particular SWIM implementation.
- SWIM Interface **210**: access implementation that includes communications, protocols and applications needed to get access to a particular SWIM service on a particular SWIM implementation.

The implementation of the PMS **132** is compliance with all particular implementations of the SWIM paradigm, especially the US SWIM **208**, European SWIM and Australian SWIM.

In connection with the secure access to SWIM, the present embodiment may take advantage of the fact that most airlines offer electronic ticketing. The passenger having an electronic flight ticket may provide some information using an electronic device to easily get online check-in and receive his electronic boarding pass to gain entrance to the aircraft at the gate.

The electronic flight ticket may facilitate the validation or authentication of passengers when accessing to SWIM. Not only passenger identity is included in the electronic flight ticket, some other important personal information can be extracted therefrom as well. As a minimum, the electronic flight ticket comprises the passenger identity, the flight identification, and the date and scheduled time of departure. In particular, the

passenger's itinerary is important to offer valuable information as indicated above.

Once the passenger is correctly identified, information can be offered that is specific to that passenger's location, itinerary.

As a way of further examples, the passenger using his electronic device may request change of seat, change of flight, or even change of airline. In response, the passenger may receive optional recommendations for reservations. Furthermore, in response to changes in their reservations additional charges or refunds against their credit card may be received. Advantageously, the passenger may make changes to rental car reservations, rail reservations, hotel accommodations, etc.

FIG. 3 depicts for a better understanding a simplified block diagram of main components showing their connections, relationships and functions that may be implemented in the systems and methods described in this document. A passenger electronic device **110** connects to the Managing Unit **206** included in PMS **132** and provides with personal data, device geolocation and device time-stamp information. The Managing Unit **206** uses these as credentials for authenticating the passenger prior to access to SWIM **208** to retrieve updated air traffic information relevant to the passenger, in particular regarding itinerary to produce a report to be displayed on the passenger electronic device **110**. Likewise, the passenger may provide or share useful information to be available to conventional SWIM stakeholders.

These and other features, functions, and advantages that have been discussed can be achieved independently in various embodiments or may be combined in yet other embodiments.

CLAIMS

1. A system for providing passenger information comprising:

- a passenger electronic device configured to send at least personal data, device geolocation and device time-stamp information;

- a managing unit configured to obtain a passenger itinerary and to confirm a passenger identity based upon a match between the personal data, device geolocation and device time-stamp information received from the passenger electronic device, and information contained in the passenger itinerary; the managing unit further configured to access updated air traffic information relevant to the passenger at a System Wide Information Management (SWIM) infrastructure upon confirming the passenger identity, and to generate and send a passenger report comprising flight status information to the passenger electronic device for display on the passenger electronic device.

2. The system of claim 1, wherein the managing unit is configured to send an automatic notification of events relevant to the passenger based upon recent geolocation, present and an inference of future of passenger's geolocation.

3. The system of claim 1 or 2, wherein the passenger report sent to the passenger electronic device further comprises at least one of the following information: passenger baggage weight, baggage location, passengers' position at airport, electronic last call and booked connecting flight.

4. The system of any of claims 1 to 3, wherein the managing unit is configured to send an input request to the passenger electronic device for updating data of the SWIM infrastructure or for reporting an emergency.

5. The system of any of claims 1 to 4, wherein the passenger electronic device is configured to receive an electronic airline ticket and to retrieve the passenger identity and passenger itinerary therefrom.

6. The system of any of claims 1 to 5, wherein passenger electronic device is selected among a group consisting of: a home or office computer, a laptop or tablet computer, a cell phone, a smart watch, an in-flight entertainment unit.

7. A computer-implemented method for providing passenger information comprising:

- receiving, from a passenger electronic device, at least personal data, device geolocation and device time-stamp information;
- obtaining a passenger itinerary and confirming a passenger identity, by a managing unit, based upon a match between the personal data, device geolocation and device time-stamp information received from the passenger electronic device, and information contained in the passenger itinerary;
- accessing updated air traffic information relevant to the passenger at a System Wide Information Management (SWIM) infrastructure upon confirming the passenger identity; and
- generating and sending, by the managing unit, a passenger report comprising flight status information to the passenger electronic device for display on the passenger electronic device.

8. The computer-implemented method of claim 7, wherein the managing unit is configured to send an automatic notification of events relevant to the passenger based upon recent geolocation, present and an inference of future of passenger's geolocation.

9. The computer-implemented method of claim 7 or 8, wherein the passenger report sent to the passenger electronic device further comprises at least one of the following information: passenger baggage weight, baggage location, passengers' position at airport, electronic last call and booked connecting flight.

10. The computer-implemented method of any of claims 7 to 9, wherein the managing unit is configured to send an input request to the passenger electronic device for updating data of the SWIM infrastructure or for reporting an emergency.

11. The computer-implemented method of any of claims 7 to 10, wherein the passenger electronic device is configured to receive an electronic airline ticket and to retrieve the passenger identity and passenger itinerary therefrom.

12. The computer-implemented method of any of claims 7 to 11, wherein the device geolocation is determined by at least one of a group consisting of: GPS circuitry in the passenger electronic device, the IP address of the passenger electronic device, by triangulation.

13. A computer program product for providing passenger information comprising computer code instructions that, when executed by a processor, causes the processor to perform the method of any of claims 7 to 12.