the purchase in the box when the door of parcel box is electronically locked, lessens disputes over lost purchases. An order loop in the merchant's order database is automatically closed when purchases are delivered to the parcel box with an assigned password that is linked to a sales campaign for these purchases and with photograph proof of the parcel inside the boxes' cavity.

[042] In one approach, the distribution storage facility is a parcel store providing storage for consolidated orders within the same locality. Parcels can be delivered to the parcel store from merchants/logistic service providers at any time. Once the parcel store receives the parcels, notification is automatically sent to an electronic device of a delivery agent who proceeds to complete the final leg of the delivery to customers within the vicinity of the parcel store.

[043] The parcel store has the following benefits. The customer receives a notification when their purchases are being sent to the store. The parcel store is located within proximity to their home, so with receipt of the notification, the customers can expect delivery of the parcels to be delivered to their parcel box soon. The delivery agent delivering from the parcel store to the parcel box can retrieve the purchases from the parcel store at any time, without needing to meetup with the merchants/logistic service providers. This increases productivity and flexibility on both sides and results in a more efficient delivery schedule. Merchants can deliver to one parcel store location where a group of customers had placed orders within a stipulated timeframe. This economy of scale for deliveries lowers the average delivery costs for the merchant, gives more flexibility with delivery schedule because there is no handover of goods to a person, but instead to a store. Group deliveries also lower the carbon footprint for the last mile delivery. The purchases are scanned against the order list of the corresponding merchant (i.e. the merchant supplying the purchases) to authenticate the deliveries. This minimizes delivery errors as purchase details are digitally retrieved and matched during the scanning process. Upon successful delivery to the parcel store, a notification will be automatically sent to the delivery agent to pick up the purchases at the parcel store. The delivery agent will then complete the last leg of the delivery to the parcel box. When the purchase is delivered and the door of the parcel box is closed, the delivery information and a photograph is sent to a database on the cloud server that hosts the electronic platform to close the delivery loop and the order loop.

[044] The parcel box and parcel store thus provide a smart storage system for delivery of purchases for the e-commerce system and co-ordinated by the electronic platform. An app with chatbots provides one or more user interface to the e-commerce system (e.g. one chatbot provides an interface for the customer while another chatbot provides another interface for another customer). Each of these chatbots is managed by a corresponding module in a cloud server that hosts the electronic platform. Chatbots are autonomous programs that simulate and process human conversation, allowing users to interact with digital devices as if they were communicating with a real person. The user interface of the e-commerce system has the following non-exhaustive features:

– a parcel box chatbot (called ParcelBox ChatBot 162 in the present disclosure): serves as a user interface to operate and communicate with the parcel box, programmed to automate tasks with minimum human intervention.

– an e-commerce module: serves as a platform for parcel box users to do online shopping and create campaigns to showcase their products.

– a payment module to facilitate online payment for goods or services promoted on the e-commerce module. Payment instruments used to fund the payment may be Internet based payment providers, a credit card company, a bank or a financial institution that facilitates payment by a customer to a merchant for purchases.

– social messaging functions for parcel box users and the e-commerce module.

[045] The e-commerce system provides group buy functionality from sales campaigns which collates purchases from individual orders to be sent in a single shipment to the parcel store that serves a community of parcel boxes. This results in competitive pricing for the goods or services (due to bulk-purchase) and a lean delivery model through the smart parcel storage system (which reduces cost in the last mile delivery). Customers can track their purchases, with automatic notification on their delivery status. Night deliveries are possible, which reduces urban congestion during the day.

[046] The e-commerce system is described in greater detail below in conjunction with the accompanying Figures.

[047] Figure 1 shows a block diagram schematic of an electronic commerce system 100 for e-commerce activities, such as an electronic marketplace.

[048] The electronic commerce system 100 has the following components: a cloud server 130; application servers 150; a destination storage facility 110 (also called “parcel store” in the present disclosure); and a distribution storage facility 180 (also called “parcel box” in the present disclosure). The system 100 interacts with one or more electronic devices 160, 166 and 168. Each of these is described in greater detail below.

[049] As mentioned above, the destination storage facility 110 is to receive delivery of purchases recorded in an order list. To serve this purpose, the destination storage facility 110 includes a protective enclosure (not shown) for storage of purchases, which may be goods or vouchers to redeem purchased goods or services packed in parcels. The destination storage facility 110 also has: a chipset 111 programmed to allow communication between a microprocessor 112; a communication module 113 (to support internet connection by either one of these communication protocols: satellite, WiFi, radio frequency (RF), Bluetooth; a camera module 114 (to take a picture of purchases from each successful delivery); and a main circuit board 115 (provides power distribution and electrical connections for all electronics in the destination storage facility 110).

[050] The destination storage facility 110 further includes: an electronic lock 116 that receives a “lock” / “unlock” command from the cloud server 130 via communication protocol 120; a manual lock 117; a

server 150, as explained above) to the destination storage facility 110 via an encrypted communication protocol 120. Feedback from the destination storage facility 110 follows a return path, i.e. over the communication protocol 120 to the ParcelBox Bot 131, which is then relayed to the ParcelBox ChatBot 162 via the API 140 on the app server 150. The ParcelBox Bot 131 also generates an E-commerce module 164 and a payment module 165. Both these modules are operating within the ParcelBox ChatBot 162.

[055] The Merchant Bot 132 generates Merchant ChatBot 167. This Chatbot 167 is the user interface for merchants and is operating within a mobile app 161 on the merchant's electronic device 166, such as a mobile phone.

[056] The LastMile Bot 134 generates the LastMile ChatBot 169. This Chatbot 134 is the user interface for the delivery agent and is operating within the mobile app 161 on the delivery agent electronic device 168, such as a mobile phone.

[057] The cloud server also provides a Payment Gateway 133 to authorize online payment transactions between the customer and the merchant.

[058] The electronic commerce system 100 provides a Parcel box Web GUI 170, which is a Web-based graphic user interface generated by the microprocessor 112 of the destination storage facility 110 for its users to execute the following functions:

- Configuration page for user
- Setting of main password
- Main password to open the destination storage facility 110
- Main password to authorize users of the destination storage facility 110
- Set merchant name to identify deliveries
- Set merchant password for access to the destination storage facility 110
- Wifi configuration to connect the destination storage facility 110 to a Wifi network
- Updating of destination storage facility 110 firmware over the internet.

[059] A Merchant Webpage 190 is provided, which is a Web-based user interface for merchants to register, login, key in the sales parameters for their products or services and to launch a sales campaign. Once a sales campaign is launched by Merchant Webpage 190, the ParcelBox Bot 131 will generate the merchants' sales campaign information into the e-commerce module 164 of the customer electronic device 160.

[060] A LastMile Agent Webpage 191 is provided, which is a Web-based user interface for the delivery agent to register for access to the distribution storage facility 180 and the LastMile ChatBot 169. It also displays the order list for items intended for the distribution storage facility 180 when the delivery man confirms delivery.

[061] Figure 2 is a high-level block diagram 200 showing the cloud server 130 and the customer electronic device 160 of Figure 1.

[062] The ParcelBox ChatBot 162 is the user interface for destination storage facility 110 users. Within the ChatBot 162 there are 2 other modules, the E-commerce module 164 and the payment module 165. The ChatBot 162, the E-commerce module 164 and the payment module 165 are all generated by the ParcelBox Bot 131. The ParcelBox Bot 131 facilitates purchases on the electronic market and their subsequent delivery by configuring the ParcelBox ChatBot 162 to seek the required input from the customer at various stages in an intuitive manner.

[063] The ParcelBox Bot 131 primary function is to receive commands from the ParcelBox ChatBot 162, the E-commerce module 164 and the module 165 and process those commands for the purpose of online shopping & payment, parcel delivery and parcel storage. The ParcelBox ChatBot 162 operates within a mobile app 161 on the customer electronic device 160 and includes the following functions:

- Allow users to set merchant name for the purpose of identifying delivered purchases
- Allow users to set the type of passwords such as one-time use, auto-renew, expired, never expire. This password authorizes the delivery agent to unlock the destination storage facility 110
- Command button to allow the destination storage facility 110 to be unlocked
- Relays input commands to the ParcelBox Bot 131 through App server 150 via the API 140 to the cloud server 130
- Setting of access levels to the destination storage facility 110x, e.g. full access or only read access
- Conferencing feature, effected by the ParcelBox Bot 131, for group chat to enable notifications going to the ParcelBox ChatBot 162 to be shared amongst the group.
- A menu that allows for:
  - checking of “order status”
  - checking of “order history”
  - Notification function in “order history” to alert a merchant of an interest in their goods or services through the Merchant Bot 132
  - Similar notification function to other destination storage facility 110 users with common distribution storage facility 180 ID. These users too can use this function to send notification to the merchant to invoke a sales campaign response from the merchant. The notification to the merchant includes a link to restart this sales campaign.

[064] The E-commerce Module 164 operates within the ParcelBox ChatBot 162 as an interface for online shopping. The information within the E-commerce module 164 is generated by the ParcelBox Bot 131 from the data entered by the merchant in the Merchant Webpage 190.

[065] The Payment Module 165 operates within the ParcelBox ChatBot 162 for the purpose of making online payment.

[066] Figure. 3 is a high-level block diagram showing a sequence 300 used by the electronic commerce system 100 of Figure 1 to allow purchase of a good or service from its electronic marketplace, followed by delivery.

Process 1: Launching of sales campaign

[067] As mentioned above, the Merchant Webpage 190 allows for merchants to register, login, key in sales parameters for products or services and to launch a sales campaign. The Merchant Webpage 190 acts as an interface to program these required details to their advertise goods or services, which upon purchase will be recorded in an order list. Once a sales campaign is launched by Merchant Webpage 190, for example from the required details being provided, the ParcelBox Bot 131 will broadcast the sales campaign to subscribers (i.e. one or more customer electronic devices 160). For example, the ParcelBox Bot 131 relays the merchant sales campaign information into the E-commerce module 164 of the customer electronic device 160.

The Merchant Webpage 190 has the following functions:

- User Registration (Company name / address / contact person / contact number / UEN no. / User name and password)
- Access by Merchant ID, to allow retrieval of database records
- Set goods or services description
- Allow for inclusion of video link for the goods or services, if available
- Set minimum order quantity for advertised goods or services
- Set maximum quantity for advertised goods or services, to ensure compliance with dimension constraints at the distribution storage facility 180 (see Process 5)
- Set campaign maximum order quantity (balance quantity is shown during ordering)
- Set a price range corresponding to quantity of purchase (e.g. $ A for purchasing 5 items, $ B for purchasing 10 items; and $ C for purchasing 15 items). This allows the sales campaign to be programmable to allow price tiering for advertised goods or services based on their purchased quantity.
- Set sales campaign duration
- Set start campaign date & time
- Set estimated delivery time
- Generation of sales ID after sales campaign starts. All sales information and promotion materials from the merchant will be updated into the cloud server 130. The ParcelBox Bot 131 will then generate the relevant campaign information in the E-commerce module 164 and send a notification to all customer electronic devices 160.
- Show campaign countdown timer
- Show campaign ordered quantity

- Indicate dimensions of package containing purchases to ensure its size fits dimensions of storage compartment at the distribution storage facility 180 (see Process 5). If the package exceeds storage compartment size, merchant is prompted to repack or call a hotline
- Key in delivery timings
- Select "Auto Search" or "Manual Search" to perform compartment search at the distribution storage facility 180 (see Process 5)
- Confirm compartment availability (see Process 5)
- Automatic waitlisting if all compartments unavailable, with option to cancel (see Process 5)
- Generate distribution access code and send to merchant upon compartment reservation
- Menu options providing a link to an order list providing details of purchases made, sales history & merchant profile.

[068] From the above, the Merchant Webpage 190 allows for a start and a duration for the sales campaign to be programmed and for the sales campaign to display the duration remaining before the sales campaign ends. While not shown, the customer electronic device 160 may also be used to launch a sales campaign, where the cloud server 130 then provides the customer electronic device 160 with the same tools to launch their sales campaign as those provided to the merchant electronic device 166.

Process 2: Broadcast sales campaign information on the user interface provided by the E-commerce module 164

[069] The ParcelBox Bot 131 broadcasts information relating to the sales campaign via the E-commerce module 164 from the data entered by the merchant in the Merchant Webpage 190.

[070] The E-commerce module 164 provides the user interface for online shopping, which is used to display the following information or seek the following input:

- Description of advertised goods or services with option to incorporate one or more links to, for example, a webpage, social media app, social messaging app for further information
- Minimum order info.
- Price tiers of the advertised goods or services, based on corresponding qty (including delivery)
- Show campaign countdown counter
- Allow selection of advertised goods or services and indication of order quantity
- Effect payment from a designated financial instrument
- Generate a delivery access code via the LastMileBot 134 for deliveryman to access the destination storage facility 110, upon successful payment
- Receive and display notification of final unit price and sales price after consolidation of total purchases by the merchant at the end of the sales campaign and successful payment

made. The Merchant Bot 132 sends a notification to the Merchant ChatBot 167 about the end of the sales campaign. The determination of the final unit price and sales price is described in more detail under Process 4 below.

Process 3: Online payment

[071] The Payment Module 165 operates within the ParcelBox ChatBot 162 for the purpose of making online payment and performs the following functions:

- Link to various online payment service providers to fund payment for the purchases
- Signal for the ParcelBox Bot 131 to generate delivery access code for the destination storage facility 110 after successful payment made. That is, delivery access code is generated after the payment for the purchases is received. This delivery access code is linked to the sales ID and store ID in the cloud server 130 database
- Close order loop upon detection of use of the delivery access code through receipt of photograph sent by destination storage facility 110 of successful delivery of purchases; notify delivery agent of closure of the order loop (see Process 10).

Process 4: Update of order list and notification to merchant and customer

[072] Update of order list in the Merchant Webpage 190 takes place upon successful online payment transaction. The order list for a sales campaign is deemed complete upon the expiration of the sales campaign.

Upon the conclusion of a sales campaign, the following occur:

- The Merchant Bot 132 sends a notification to the Merchant ChatBot 167 on the conclusion of the sales campaign. The Merchant chatbot 167 serves as a user interface and communication channel for the merchant to receive the notification with a link to the order list accessible from the merchant webpage 190. This allows the merchant to consolidate the total purchases and prepare them for delivery. In addition, in an approach where the advertised price of a good or service for each quantity is an estimate, the final price of the good or service can then be established at the end of the sales campaign from the total purchased quantity of the advertised goods and services obtained from the order list. In one approach, the final price is determined by parameters keyed in by the merchant when programming the sales campaign using the Merchant Webpage 190 as per Process 1, the parameters specifying a range of final prices based on total quantity purchased. The system then reflects the final price per unit and the total price of all purchases in the order list, which the merchant can access via the Merchant Chatbot 167.
- The ParcelBox Bot 131 sends a notification to Parcelbox Chatbot 162 on the final price of the purchases, established from the total purchased quantity of the advertised goods and

services obtained from the order list. Payment for the purchases at the final price is then collected, for example from the customer's indicated payment instrument. In one approach, before establishment of the final price, an authorisation hold is placed on the payment instrument used to fund the payment at the advertised price of the good or service at the time of purchase. The authorisation hold is released after the collection of payment at the final price. A refund to the payment instrument is effected, if pre-payment is received before the establishment of the final price, amounting to a difference between the final price and the pre-payment amount (i.e. between the final price and the advertised price of the good or service at the time of purchase). Should the authorisation hold only result in the reservation of funds on the payment instrument at the advertised price of the good or service, but no actual deduction, then no refund is effected.

- The final order list will be automatically updated in the Merchant Webpage 190.

Process 5: Confirmation of store compartments

[073] After the purchases are packed, the merchant can initiate compartment reservation at the distribution storage facility 180.The distribution storage facility 180 has one or more compartments for receipt of the purchases enroute to the destination storage facility 110. The one or more compartments may be organised as follows. In one approach, each merchant is allowed to reserve one or more compartments to receive their packaged purchases since a single compartment may not provide sufficient space to store all of them. Accordingly, at any instance, the distribution storage facility 180 may store purchases for several different merchants, enroute to their respective destination storage facility 110. Each of the packages in a reserved compartment may be destined for a different destination storage facility 110, where delivery to the correct destination storage facility 110 is through referencing the order list. In a second approach, each compartment is intended for packages addressed to a specific destination storage facility 110. That is, one compartment can be assigned for packages to a destination storage facility 110 at an address, while another compartment can be assigned for packages to a destination storage facility 110 at a different address.

[074] The merchant reserves one or more compartments at the distribution storage facility 180, if available. If the one or more compartments is unavailable, the merchant can request to be placed on queue. The distribution access code is generated after the one or more compartments are reserved.

[075] During the reservation, the merchant is prompted for a dimension of the package containing the purchases. The dimension of the package is compared against a dimension of the one or more compartments. The reservation or the queueing of the one or more compartments is allowed to proceed if they are determined to accommodate the package containing the purchases.

[076] While the merchant may already have packed the purchases to the correct sizes, the dimension checking feature confirms that the packages are correctly sized during compartment reservation in the distribution storage facility 180 for the last mile delivery.

[077] The merchant electronic device 166 is used to reserve the one or more compartments in the distribution storage facility 180 via the Merchant Webpage 190 which has the following functions:

- Generate a label (e.g. in any one of the following formats: barcode, QR code) for each sales transaction in the order list. The label indicates the purchases for delivery to each of the one or more reserved compartments, the label further providing details of the order list to which the purchases belong. The label is for attachment onto the packed purchases.
- Allow the package dimension LxBxH to be entered in a "dimension field" to ensure its size fits into the compartment that is to be reserved. If the package exceeds the compartment size, the merchant is prompted to repack or call a hotline. In one approach, the distribution storage facility 180 provides for compartments in at least two sizes.
- Key in "delivery timings", i.e. an approximate time that the purchases will be delivered to the distribution storage facility 180.
- Allow selection of "Auto Search" to activate compartment search via the LastMile Bot 134. "Auto Search" relies on postal codes provided during registration of the destination storage facility 110. A distribution storage facility 180 is assigned to a cluster of postal codes by an algorithm, which performs placement, for example, based on proximity. With sales campaign being launched by area, the area will have one or more pre-assigned distribution storage facilities 180. "Auto Search" will identify the pre-assigned distribution storage facilities 180 with sufficient empty compartments based on the postal code of the customer making the purchase. Accordingly, purchases are collated to the distribution storage facility 180 pre-assigned to serve a cluster of destination storage facilities 110 to which a destination storage facility (that eventually receives the purchase) belongs. The pre-assignment is based on proximity of the cluster of the destination storage facilities to the distribution storage facility.
- Confirm compartment availability.
- Automatic waitlisting if all compartments unavailable, with option to cancel.
- Allow for "Manual Search" to locate a distribution storage facility 180 with sufficient available compartments, described in more detail in the accompanying description below for Figure 5.

<u>Process 6: Notification to merchant and delivery agent upon successful distribution storage facility 180 reservation</u>

[078] When a distribution storage facility 180 is successfully reserved, the following occur:

a) The LastMile Bot 134 generates a notification through the LastMile ChatBot 169 to inform delivery agents, through their electronic devices 168, of the estimated delivery timings at the distribution storage facility 180. This is to invite for one or more of these electronic

[082] Once purchases are successfully stored into the distribution storage facility 180, the Merchant Bot 132 will generate a notification through the Merchant ChatBot 167 of the successful delivery of the purchases.

c) Notification to users of the destination storage facility 110 of successful delivery of their purchases to the distribution storage facility 180

[083] Once purchases are successfully stored into the distribution storage facility 180, the ParcelBox Bot 131 will generate a notification through the ParcelBox ChatBot 162 of the successful delivery of the purchases to the distribution storage facility 180. Accordingly, notification of the successful delivery to the distribution storage facility 180 is transmitted to the customer electronic device 160 to which the destination storage facility 110 is registered.

Process 9:

[084] The delivery agent uses the distribution access code to open the distribution storage facility 180. The delivery agent retrieves the package from the correct compartment based on the order list. Delivery is then made to the destination storage facility 110 indicated in the order list, using the corresponding delivery access code (received as described above in Process 8).

Process 10:

[085] Once purchases are successfully delivered to the destination storage facility 110, a notification is sent from the destination storage facility 110 to the cloud server 130 database via the encrypted communication protocol 120, which results in the following:

a) Update the sales record in the cloud server 130 database as closed. This updates the order list on the successful delivery of the purchases to the destination storage facility 110.

b) Notify the customer electronic device 160 to which the destination storage facility 110 is registered on successful delivery of the purchases to the destination storage facility 110. This notification is in the form of the ParcelBox Bot 131 transmitting to the ParcelBox ChatBot 162 a confirmatory message from the merchant supplying the purchases and a photograph of the purchases inside the destination storage facility 110.

[086] Figure 4 shows a sequence 400 for the delivery of purchases from the merchant to the distribution storage facility 180.

[087] Before the sequence 400 occurs, the merchant reserves a compartment in the distribution storage facility 180, through the Merchant Webpage 190. As mentioned under Process 5 above, there are two reservation modes:

a) Compartment reservation, Auto Mode

[088] The LastMile Bot 134 retrieves the package dimension information, delivery timings, order list details from Cloud server upon receipt of the "Auto search" command from Merchant Webpage 190. One or more compartments based on availability and size is reserved. If no compartment is available, packages are automatically put on a waitlist, with an option to cancel.

[089] Upon confirmation of reservation, the distribution access code is automatically generated by the LastMile Bot 134 and sent to the Merchant ChatBot 167 in the merchant electronic device 166.

b) Compartment reservation, Manual Mode

[090] The merchant chooses a distribution storage facility 180 via the Merchant Webpage 190 by keying in the ID of the distribution storage facility 180. The ID of the distribution storage facility 180 that services a residential cluster to which the destination storage facility 110 (where purchases are to be eventually delivered) belongs is stated on the order list. Once a particular store ID is entered, the compartment status of the distribution storage facility 180 is displayed on the Merchant Webpage 190.

[091] The status of compartments of the distribution storage facility 180 is shown on the Merchant Webpage 190 either as "Occupied", "Reserved" or "Available". The merchant chooses an available compartment from the Merchant Webpage 190 based on availability and size, with the merchant being able to book more than one compartment.

[092] The merchant then enters the sales ID, which is used for verification purposes. Upon successful verification, the merchant can choose an empty compartment or waitlist his package for the next available compartment.

[093] Upon confirmation of reservation, the distribution access code is automatically generated by the LastMile Bot 134 and sent to the Merchant ChatBot 167 in the merchant electronic device 166.

[094] Following the successful reservation, the sequence 400 to deliver the purchases to the distribution storage facility 180 is as follows.

[095] In step 1, the identity of the delivery agent is verified through the presentation of the correct distribution access code at the distribution storage facility 180, cross referenced against the distribution access code in the order list that corresponds to the merchant providing the purchases and the corresponding sales campaign. The door 410 of the reserved compartment opens if the distribution access code is correct.

[096] In step 2, the purchases are verified against the same order list. The label on the purchases (see Process 5) is read by the scanner 420 to identify whether the purchases match those for which the compartment in the distribution storage facility 180 is reserved, as recorded in the order list. Successful verification authenticates the purchases being delivered to the compartment in the distribution storage facility 180. Any discrepancies between the scanned goods and the order list, is notified to the Merchant ChatBot 167 in the merchant electronic device 166 via the Merchant Bot 132 in step 3.

[097] Each successful delivery to the distribution storage facility 180, will be notified to the Merchant ChatBot 167 of the merchant electronic device 166 through the Merchant Bot 132 in step 4a. Each successful delivery also has the LastMile Bot 134 generate in step 4b a notification through the LastMile

ChatBot 169 to inform delivery agents to confirm pickup. In addition, a notification is generated by the ParcelBox Bot 131 and sent to the ParcelBox Chatbox 162 of the customer electronic device 160 to which the destination storage facility 110 is registered that their purchase has reached the distribution storage facility 180, so that the customer can clear the destination storage facility 110 for pending delivery.

[098] In step 5, the distribution access code and a link to the order list is sent to the delivery agent electronic device 168 that confirms pickup. In step 6, the order list is accessed via the LastMile agent webpage 191 and the LastMile ChatBot 169 by the delivery agent electronic device 168 for the designated compartment in the distribution storage facility 180. This order list also contains the delivery access code for the corresponding destination storage facility 110.

[099] In step 7, the delivery agent uses the distribution access code to open the compartment of the distribution storage facility 180 for which pickup is confirmed and retrieves the purchases from that compartment.

[100] Figure 5 is a diagram summarising the flow of purchases from online order to the end customer.

[101] Upon successful online order and the conclusion of a sales campaign, a merchant 520, 521, 522 packs and labels the purchases according to the order list 440 for each individual customer. The merchant 520, 521, 522 then reserves a compartment in the distribution storage facility 180 and arranges the logistical requirements to send the purchases to the distribution storage facility 180.

[102] After the purchases are successfully sent to the distribution storage facility 320 by the merchant 520, 521, 522 or their logistic service provider, a notification will be sent to delivery agents to confirm pickup. The delivery agent who confirms the pickup will receive the distribution access code to the distribution storage facility 320 and a link to the order list 440. This order list 440 is now accessible via the LastMile agent webpage 191 and the LastMile ChatBot 169 to the delivery agent for the designated distribution storage facility 320. This order list 440 also contains the delivery access code for the corresponding destination storage facility 510 to 517.

[103] The LastMile ChatBot 169 (refer Figure 3) provides a route optimization feature that helps to plan an optimised route for delivery of the purchases for the delivery agent electronic device 168 that accepts to deliver the purchases from the distribution storage facility 320 to the destination storage facility 510 to 517, based on an address of the destination storage facility 510 to 517. For completed delivery, the destination storage facility 510 to 517 sends a signal via communication protocol 120 to close the sales loop for the delivery of that purchase on the order list. Therefore, the order list 440 gets updated in real-time showing to the delivery agent which items are still open in the delivery route.

[104] Upon successful delivery to the destination storage facility 510 to 517, the following functions are performed automatically:

[105] A notification is sent to the end customer via the ParcelBox Bot 131 to the ParcelBox ChatBot 162 informing of goods being received from the merchant. At the same time, a photo is taken of the

contents inside the destination storage facility 510 to 517 when its door is closed. This serves as evidence of delivery by the delivery agent and minimizes dispute relating to missing purchases.

[106] Upon successful destination storage facility 510 to 517 delivery, the sales records in the cloud database will be updated as closed.

[107] The order list 440 in the LastMile agent webpage 191 and the LastMile ChatBot 169 will be updated with each successful delivery.

[108] The Merchant Bot 167 also allows for previous sales campaigns to be relaunched. Such a request may be initiated by the ParcelBox ChatBot 162. The Merchant Bot 167 then prompts the Merchant ChatBot 167 in the merchant electronic device 166 for the merchant providing the previous sales campaign to respond to the request to relaunch a previous sales campaign.

[109] The destination storage facility 510 to 517 and the distribution storage facility 320 is also configurable to receive purchases from any e-commerce platforms and brick and mortar retailer. These merchants are onboarded by entering their details into the ParcelBox chatbot 162 in the customer electronic device 160. The ParcelBox ChatBot 162 then generates a password for each of them. The password is shared with the merchant, for example as part of delivery instructions when a purchase is made. The merchant in turn shares the password with the delivery person to access the destination storage facility 510 to 517 and/or the distribution storage facility 320. In this manner, the destination storage facility 510 to 517 and/or the distribution storage facility 320 can recognise other passwords; and allow access in response to receipt of the password from an electronic device that communicates with the destination storage facility 510 to 517 and/or the distribution storage facility 320.

[110] While this invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes can be made and equivalents may be substituted for elements thereof, without departing from the scope of the invention. In addition, modification may be made to adapt the teachings of the invention, without departing from the essential scope of the invention. Thus, the invention is not limited to the examples that are disclosed in this specification, but encompasses all embodiments falling within the scope of the appended claims.

1. The parcel box is designed to contain and temporarily store parcels or objects for delivery (parcel-in) or collection (parcel-out) purposes. The parcel box comprises:
    - A storage enclosure
    - An electronic lock integrated with proprietary circuitry
    - A physical lock
    - A sensor switch that monitors the door close position
    - A proprietary circuitry to control functionality of box with the following features
    - Built-in WIFI or SIM communication module to facilitate connection to the internet
    - opening of box with set password, password is set on user's smart device and in a dynamic way, meaning user can change it anytime
    - Battery level monitoring and notification is sent to user each time box is used
    - Battery level warning when battery power drops below a certain level
    - Built in camera system to automatically take picture of contents at the end of each "open and close" cycle
    - Power saving mode functionality when box is not in use, the entire circuitry powers down to prolong battery life
    - Built-in MEMs IMU module to sense movement of the parcel box to trigger a buzzer as an anti-theft function

2. The user interface of the parcel box is a chatbot that is operating within an app on a smart device to receive commands and to interact with the parcel box.

3. The chatbot can be added to a group chat in order for a community to receive notification from the parcel box.

4. The parcel box is fully integrated to the e-commerce system with the chatbot as the user interface, providing real-time feedback to a parcel box user, deliveryman and the cloud database when a successful delivery is made.

5. A webpage user interface is used for the initial setup and configuration of the parcel box, such as setting of main password to authorize box users, identify merchant deliveries, set the type (one-time / auto-renew / never expire) of password for delivery person. The webpage also includes a function to update the parcel box firmware over the Internet when new features are added or to enhance user experience during interaction with the parcel box.

6. The parcel box communicates with the user via an encrypted communication protocol via a parcel box BOT in a cloud server and from the cloud server via an API to an App server which

hosts the mobile app where the parcel box chatbot is residing and acting as the user interface with the following functions:

- Allow users to set merchant's name for the purpose of identifying delivered parcels
- Allow users to set the type of passwords such as one-time use, auto-renew, expired, never expire. This password authorizes the deliveryman to unlock parcel box
- Command button to allow parcel box to be unlocked
- Upon receiving commands from users, acts as a messenger to parcel box BOT which is operating in the cloud server
- Setting of user access to box, full access or only read access
- Parcel box BOT has a conferencing feature, therefore parcel box chatbot can be setup for group chat to enable notifications going to the chatbot to be shared amongst the group
- A menu that allows for:
    - checking of "order status"
    - checking of "order history"
    - "Poke" function in "order history" sends notification to Merchant BOT to notify merchant of interest in his products
    - Same Poke function sends notification to box users with common store ID, this ID is set during user registration process. The notification includes a "Poke" button and product link for more users to invoke a previous sales campaign from the merchant

7. An e-commerce system comprising an online shopfront, payment module and integrated to the parcel box of statements 1 to 6.

8. The e-commerce system provides a merchant webpage as a user interface for merchants to register, login, key in the sales parameters for their products and to launch a sales campaign with a unique sales ID tied to the sales record of that particular sales campaign.

The merchant webpage has the following functions:

- Registration (Co. Name / address / contact person / contact number / UEN no. / User name and PW)
- Access by Merchant ID
- Each Merchant ID has its own database location
- Set goods description
- Send video link
- Set minimum order quantity

- Set maximum order quantity for box size A and box size B
- Set campaign maximum order quantity (balance quantity is shown during ordering)
- Set 3 price range corresponding to quantity
- Set sales campaign duration
- Set start campaign date & time
- Set estimated delivery time
- Once campaign starts, Sales ID will be automatically generated. All sales information and promotion materials from the merchant will be updated into the cloud server 130. The Parcelbox Bot 131 will then generate the relevant campaign information in the e-commerce module 164 and send a notification to all Box users
- Show campaign countdown timer
- Show campaign ordered quantity
- After packing and labelling according to order list (label contains the QR code generated),
- key in package dimension LxBxH in the “dimension field” for store compartments to authenticate that the sizes fits. If final packed sizes exceed both compartment sizes, merchant is prompted to repack or call a hotline
- Key in “delivery timings”
- Click “Auto Search” to activate Store compartment search
- Confirms Compartment
- Automatically waitlisted if all compartments unavailable (with “cancel waitlist” option)
- Or “Manual Search” Store Compartment”
- Once compartment is reserved, “OTP store” is automatically generated and sent to Merchant
- Consist of menu buttons that link to Order list, sales History & merchant profile

9. When a sales campaign is launched in the merchant webpage, a parcel box Bot (a software program that performs automated and pre-defined tasks) operating in the cloud server, will generate the merchant’s sales campaign information into the e-commerce module on the parcel box chatbot displaying the following information for the purpose of online shopping:
    - Goods Description
    - Advertising link, on a webpage, social media app, social messaging app
    - Min order info.
    - 3 sets of prices based on corresponding qty (price to include delivery)
    - Shows campaign countdown counter
    - Selection of goods
    - Enter order quantity
    - Click payment

10. The parcel box BOT operating in the cloud server, generates the payment module in the parcel box chatbot user interface, for the purpose of making an online payment.

11. The payment module within parcel box chatbot facilitates online payment via the payment gateway link in the cloud server. Upon successful payment, a software BOT (herein known as LastMile Bot) operating in the cloud server automatically generates a One-Time-Password (OTP) for access to the parcel box. This OTP is linked to the sales record in the cloud database and accessible from the delivery agent webpage, known as the LastMile agent webpage.

12. Once the sales campaign ends and successful online payment is made:

i) proprietary merchant Bot (a software program that performs automated and pre-defined tasks) operating in the cloud server will send a notification to merchant chatbot via a proprietary API to an App server which hosts the mobile app where the merchant chatbot is residing and acting as the user interface for the merchant, informing to check the order list and providing a link to merchant webpage to access the final order list.

The merchant chatbot performs the following functions:

a) Notification to merchant

- Notification of interest for previous sales campaign from box users
- Along with box user's notification of interest, a link is provided to activate a previous sales campaign

b) User menu with the following commands:

- Click Order list button (links to Merchant Webpage)
- Click Sales History button (links to Merchant Webpage)
- Edit profile (links to Merchant Webpage)
- Activate a new sales campaign

ii) Proprietary parcel box Bot (a software program that performs automated and pre-defined tasks) operating in the cloud server will send a notification to parcel box chatbot via a proprietary API to an App server which hosts the mobile app, informing the customer of the final unit price and final total price of the goods and providing a link to access their order list. Further, the notification message will include a message to check the battery level.

iii) the final order list will be automatically updated in the merchant webpage

13. A parcel store forms a part of the last mile delivery of the supply chain. The merchant after packing his goods based on the order list, can reserve a store compartment in parcel store for the last mile delivery. The reservation of the store compartment is done via merchant webpage which has the following functions:
    - QR code for each sales transaction is generated from the order list. The QR code is labelled onto the packed items
    - key in package dimension LxBxH in the "dimension field" for store compartments to authenticate that the sizes fits. If final packed sizes exceed both compartment sizes, merchant is prompted to repack or call a hotline
    - Key in "delivery timings"
    - Click "Auto Search" to activate Store compartment search via LastMile Bot, LastMile Bot communicates with the parcel store via proprietary communication protocol to get an updated status of the store compartments and sends this information back to the merchant webpage for the merchant to reserve the store compartment
    - Confirms Compartment
    - Automatically waitlisted if all compartments unavailable (with "cancel waitlist" option)
    - Or "Manual Search" Store Compartment"
    - Once compartment is reserved, one-time password for store compartment is automatically generated and sent to Merchant

14. The merchant Bot receives the store compartment reservation confirmation from the LastMile Bot and automatically sends a notification to merchant chatbot with a one-time password for the merchant to access the parcel store.

15. The LastMile Bot after receiving confirmation from merchant webpage for store reservation, automatically sends a notification to LastMile chatbot to inform the delivery person (deliveryman who delivers from the parcel store to the parcel box) of a pending delivery at the parcel store with date and timing information.

16. The LastMile Bot, upon successful parcel delivery at parcel store, will automatically generate a notification through LastMile ChatBot to inform delivery agents to confirm pickup. Once a deliveryman confirms pickup, an OTP store will be sent to deliveryman along with a link to the order list. This order list is now accessible via LastMile agent webpage to the deliveryman for the designated parcel store. This order list contains customer's contact, address and OTP for the individual parcel boxes.

17. The LastMile Bot provides a route optimization feature that plans and optimizes delivery routes for the deliveryman according to the delivery addresses on the order list. LastMile Bot generates the user interface Last Mile ChatBot, with the route optimization feature integrated within the chatbot. This is made possible with digitization of data from the sales campaign, that is linked with the delivery data to and from the parcel store and parcel box forming a seamless data loop to facilitate this route optimization feature. For completed delivery, the parcel box will send a signal via communication protocol to close the sales loop for the delivery of that particular item on the order list. Therefore, this order list gets updated in real-time showing to the delivery man which items are still open in the delivery route.

18. The LastMile Bot, upon successful parcel delivery at parcel store, will communicate to the Parcelbox Bot and automatically send a notification to parcel box chatbot to inform the customer that their goods from that particular merchant had been delivered to the parcel store.

19. Upon successful parcel delivery at parcel box, the microprocessor within the parcel box will automatically send the delivery status via encrypted proprietary communication protocol to the cloud server. The ParcelBox Bot residing in the cloud server will then send a notification to parcel box chatbot to inform the customer that their goods from that particular merchant had been delivered to the parcel box and coupled with a picture of the goods taken inside the box when the door closed signal is activated.

20. Upon successful parcel delivery at parcel box, the microprocessor within the parcel box will automatically send the delivery status via encrypted communication protocol to the cloud server. A successful delivery status when box OTP is used and photograph taken, will automatically close the order database in the cloud server. The picture taken by parcel box will be retained as evidence of delivery in the order database.

21. The parcel store has multiple storage compartments for the purpose of parcel deliveries. The store further provides the following functionality:

    a) Reservation of store compartments by Merchant or delivery agent with two reservation modes via the Merchant webpage:

Auto Mode

- LastMile Bot retrieves package dimension information, delivery timings, order list details from Cloud server with “Auto search” command from Merchant Webpage

link. This order list is now accessible to the deliveryman who had confirmed the pickup at the designated parcel store via LastMile agent webpage.

- Notification is generated by Merchant Bot and sent via Merchant ChatBot to inform merchant of successful delivery to store
- Notification is generated by ParcelBox Bot and sent via ParcelBox Chatbox to inform parcel box user that goods had been sent to store and to clear parcel box and check parcel box battery level for pending delivery

23. End-to-end e-commerce system that integrates e-commerce to goods delivery with a smart parcel storage system having the parcel store and the parcel box. The entire system comprises:
    a) App based user interface on a smart device for parcel box user to control the box over an internet network and to do online shopping and e-payment
    b) Web based user interface for merchants to launch a sales campaign to parcel box users directly and with app notification
    c) App based user interface on a smart device for delivery agent to receive notification of OTP for store and box access. As well, the app allows delivery agent access to the order list related to his delivery job
    d) Parcel store that allows the merchant to reserve store compartments to deliver his goods. The parcel store serves a cluster of residential blocks. The parcel store communicates to the merchant, delivery agent and box users on the same sales campaign via software Bots
    e) Parcel box comprise of the following functions when goods are successfully delivered:
        - A notification is sent to the end customer via parcel box Bot to parcel box ChatBot informing of goods being received from the merchant. At the same time, a photo is taken of the contents inside the box when the door of the parcel box is closed. This serves as evidence for the deliveryman for goods being successfully sent and minimizes dispute relating to missing parcels.
        - With the successful parcel box delivery, the sales records in the cloud database will be updated automatically as closed.
        - The order list in the LastMile agent webpage will be updated with each successfully delivery. This webpage is accessible to the deliveryman.

CLAIMS

1. An electronic commerce system that hosts an electronic marketplace, the system configured to:

create an order list containing details of purchases from the electronic marketplace;

generate an access code for a distribution storage facility to which the purchases is sent enroute to a destination provided in the order list, the distribution access code being held in the order list; and

generate an access code for the destination storage facility located where the purchases are to be delivered, the delivery access code being held in the order list.

2. The electronic commerce system of claim 1, further configured to:

provide a user interface to program a sales campaign to advertise goods or services from which the order list is created; and

broadcast the sales campaign to subscribers of the system.

3. The electronic commerce system of claim 2, wherein the sales campaign is programmable to allow price tiering for the advertised goods or services based on their purchased quantity.

4. The electronic commerce system of claim 2 or 3, wherein the user interface allows for a start and a duration for the sales campaign to be programmed; and for the sales campaign to display the duration remaining before the sales campaign ends.

5. The electronic commerce system of any one of the preceding claims, further configured to:

reserve one or more compartments at the distribution storage facility, if available; or

queue for the one or more compartments, if unavailable, wherein the distribution access code is generated after the one or more compartments are reserved, the one or more compartments for receipt of the purchases enroute to the destination storage facility.

6. The electronic commerce system of claim 5, further configured to:

prompt for a dimension of a package containing the purchases;

compare the dimension of the package against a dimension of the one or more compartments; and

proceed with the reservation or the queueing when the one or more compartments is determined to accommodate the package containing the purchases.

7. The electronic commerce system of claim 5 or 6, further configured to:

generate a label indicating the purchases for delivery to each of the one or more reserved compartments, the label further providing details of the order list to which the purchases belong.

8. The electronic commerce system of claim 7, further configured to:

notify successful delivery of the purchases to the distribution storage facility in response to the one or more reserved compartments indicating detection of the label being on their received purchases.

9. The electronic commerce system of claim 8, further configured to:

transmit the notification of the successful delivery to the distribution storage facility to an electronic device to which the destination storage facility is registered.

10. The electronic commerce system of any one of the preceding claims, further configured to:

invite for one or more electronic devices to bid to deliver the purchases from the distribution storage facility to the destination storage facility.

11. The electronic commerce system of claim 10, further configured to provide to the electronic device that accepts to deliver the purchases from the distribution storage facility to the destination storage facility:

access to the order list to retrieve the distribution access code and the delivery access code; and

track delivery of the purchases.

12. The electronic commerce system of claim 10 or 11, further configured to:

plan an optimised route for delivery of the purchases for the electronic device that accepts to deliver the purchases from the distribution storage facility to the destination storage facility, based on an address of the destination storage facility.

13. The electronic commerce system of any one of the preceding claims, further configured to:

collate the purchases to the distribution storage facility pre-assigned to serve a cluster of destination storage facilities to which the destination storage facility belongs, the pre-assignment being based on proximity of the cluster of the destination storage facilities to the distribution storage facility.

14. The electronic commerce system of any one of the preceding claims, further configured to:

establish a price of the goods or vouchers to redeem a good or a service from their total purchased quantity obtained from the order list;

notify purchasers of the goods or vouchers to redeem a good or a service of the established price; and

collect payment for the purchases at the established price.

15. The electronic commerce system of claim 14, further configured to, before establishment of the price,:

place an authorisation hold on a payment instrument used to fund the payment;

release the authorisation hold after the collection of payment; and

effect a refund, if pre-payment is received before the establishment of the price, to the payment instrument amounting to a difference between the established price and the pre-payment amount.

16. The electronic commerce system of claim 14 or 15, wherein the delivery access code is generated after the payment for the purchases is received.

17. The electronic commerce system of any one of the preceding claims, further configured to:

notify an electronic device to which the destination storage facility is registered on successful delivery of the purchases to the destination storage facility; and

update the order list on the successful delivery of the purchases to the destination storage facility.

18. The electronic commerce system of any one of the preceding claims, further configured to:

receive a request for relaunch of a previous sales campaign; and

prompt for a response from a merchant providing the previous sales campaign to the relaunch request.