FIG.1

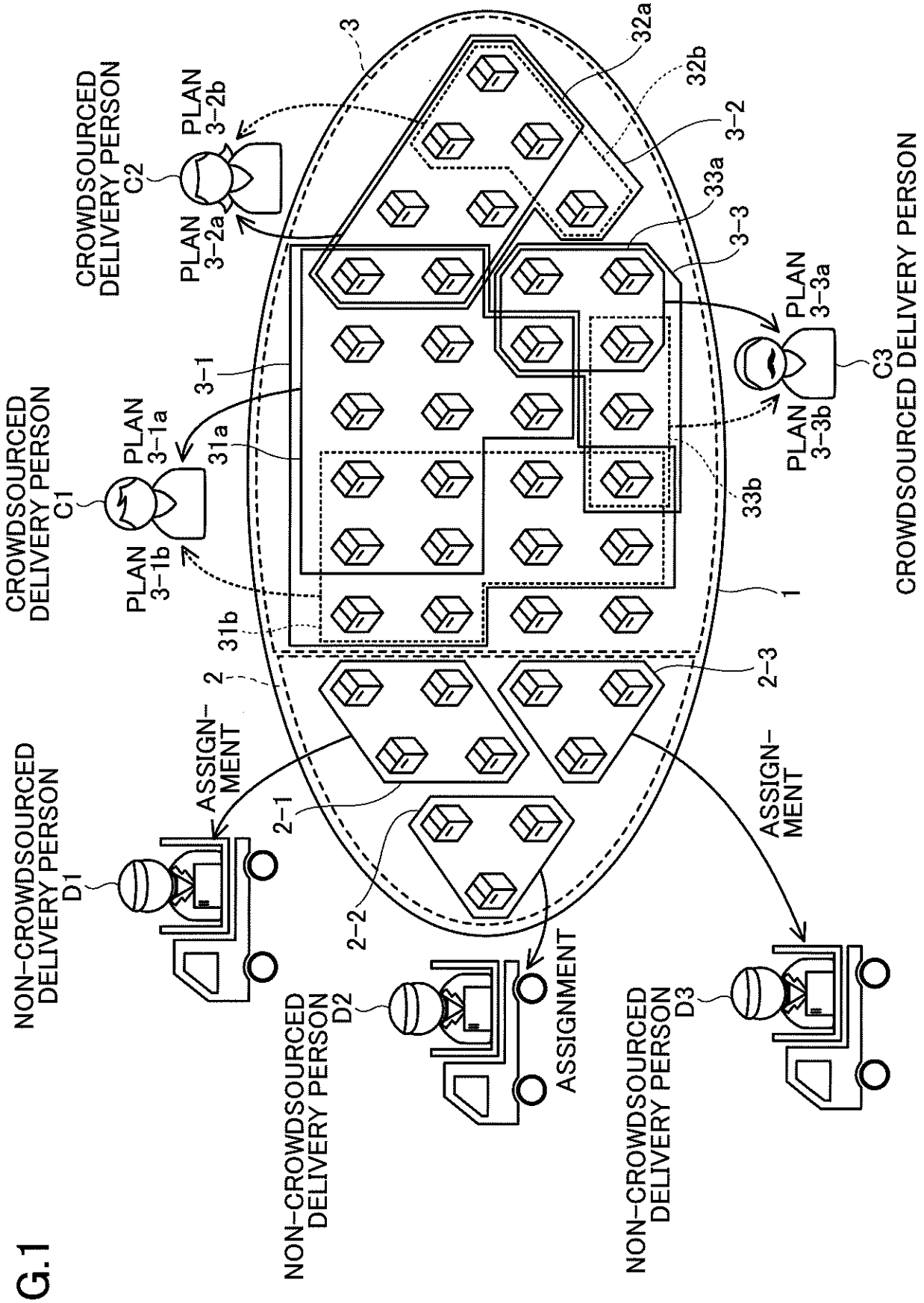

3
32a
32b
3-2
33a
3-3
33b
1
31a
31b
2
2-1
2-2
2-3
3-1
CROWDSOURCED DELIVERY PERSON C2
PLAN 3-2b
PLAN 3-2a
CROWDSOURCED DELIVERY PERSON C1
PLAN 3-1a
PLAN 3-1b
PLAN 3-3a
PLAN 3-3b
C3
CROWDSOURCED DELIVERY PERSON
ASSIGN-MENT
ASSIGN-MENT
NON-CROWDSOURCED DELIVERY PERSON D1
NON-CROWDSOURCED DELIVERY PERSON D2
ASSIGNMENT
NON-CROWDSOURCED DELIVERY PERSON D3

FIG.2

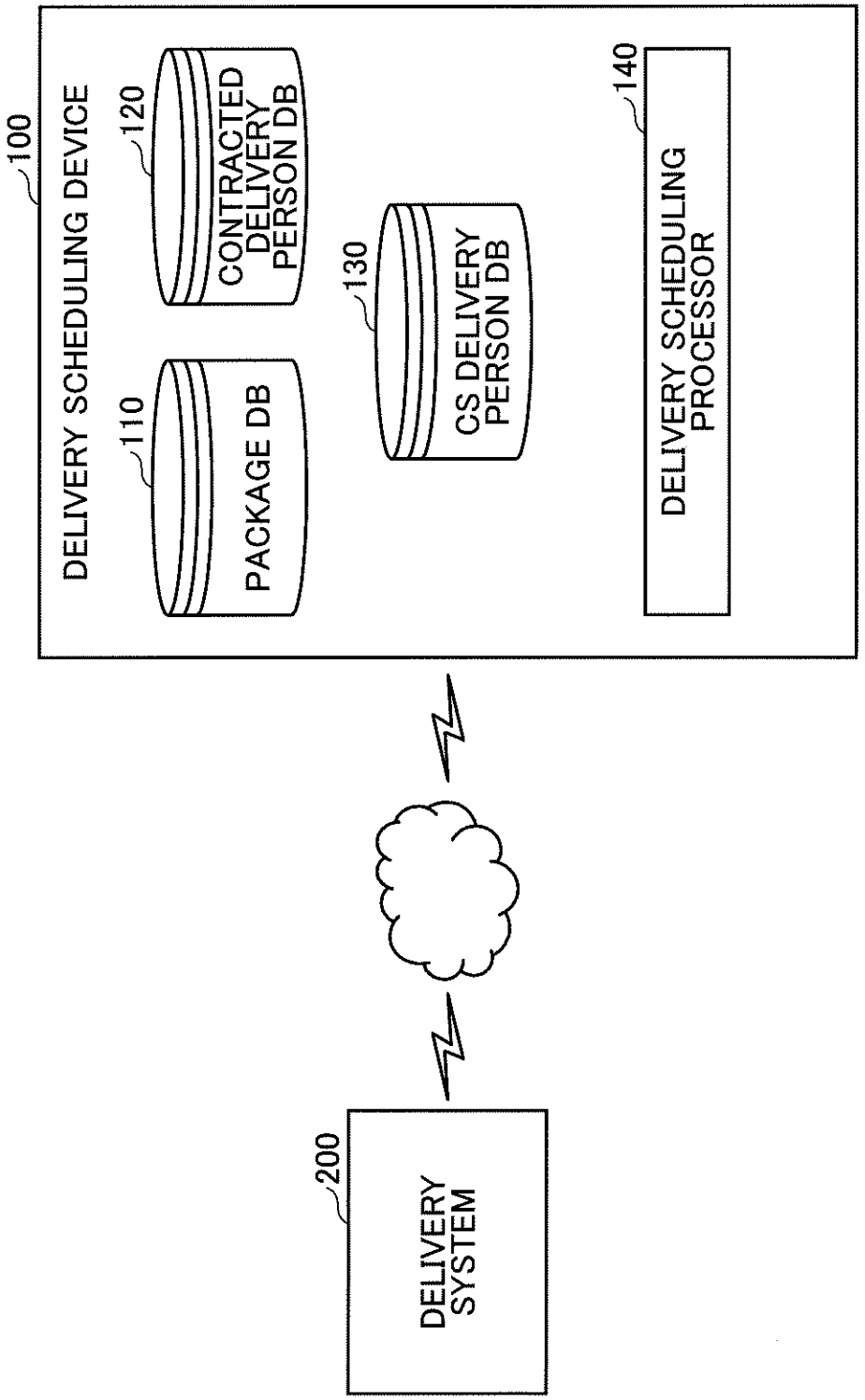

100
DELIVERY SCHEDULING DEVICE
110
PACKAGE DB
120
CONTRACTED DELIVERY PERSON DB
130
CS DELIVERY PERSON DB
140
DELIVERY SCHEDULING PROCESSOR
200
DELIVERY SYSTEM

FIG.3

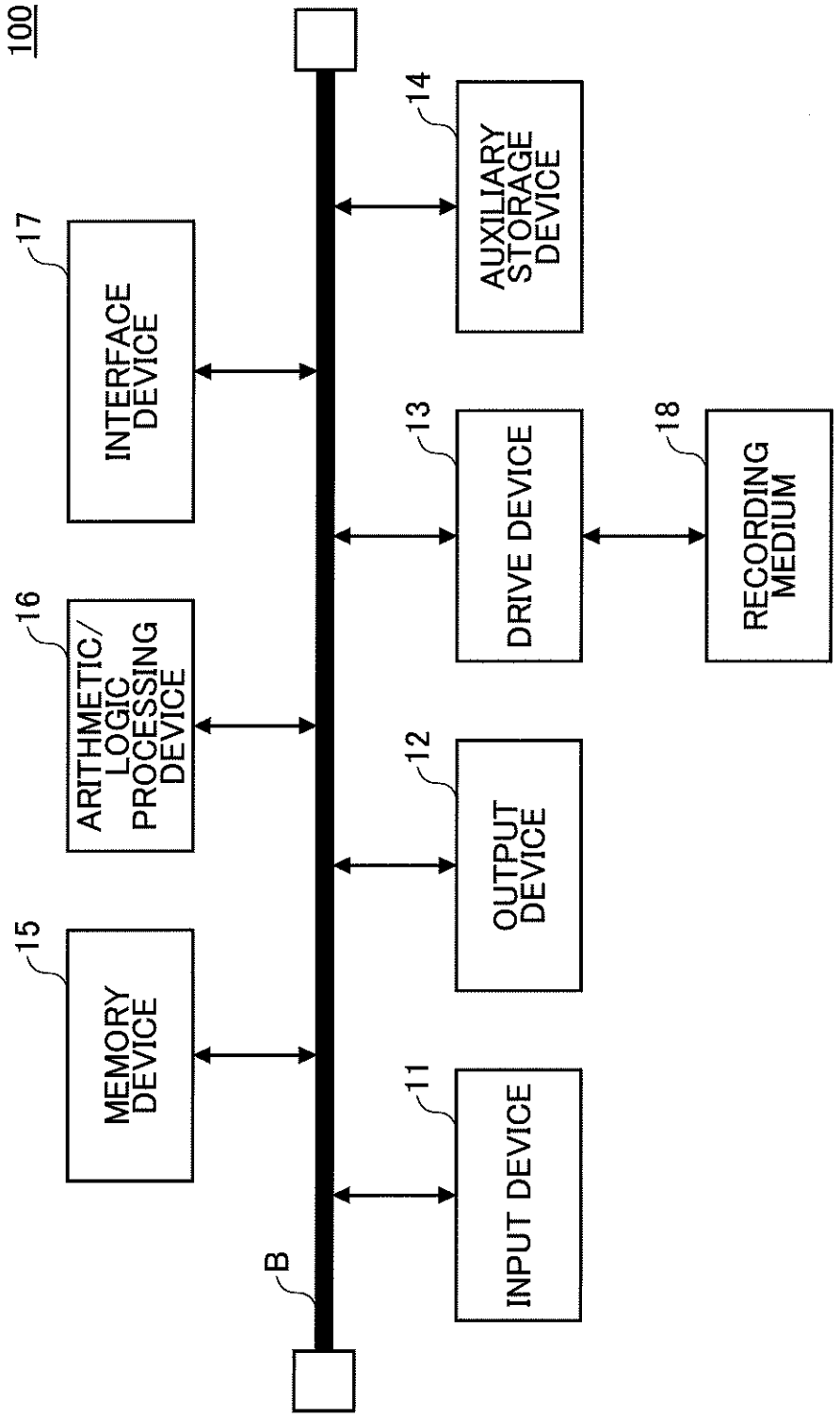

100
INPUT DEVICE
11
OUTPUT DEVICE
12
DRIVE DEVICE
13
AUXILIARY STORAGE DEVICE
14
MEMORY DEVICE
15
ARITHMETIC/ LOGIC PROCESSING DEVICE
16
INTERFACE DEVICE
17
RECORDING MEDIUM
18
B

FIG.4

110

PACKAGE ID	CENTER CODE	CENTER NAME	AD-DRESS	POSTAL CODE	ACCEPTABLE LOADING/ UNLOADING HOURS	REGIS-TRATION DATE AND TIME	SENDER	DESTI-NATION	TYPE	WEIGHT	SIZE	PRI-ORITY
001	××	AA	・・・	・・・	05:00-22:00	・・・	・・・	・・・	FOOD	5 KG	・・・	HIGH
002	××	AA	・・・	・・・	05:00-22:00	・・・	・・・	・・・	・・・	・・・	・・・	-
003	○○	BB	・・・	・・・	09:00-18:00	・・・	・・・	・・・	・・・	・・・	・・・	LOW

FIG.5

120

DRIVER ID	DEPARTURE LOCATION	LOADING CAPACITY	WORKING HOURS
101	AA CENTER	・・・	09:00-16:00
102	BB CENTER	・・・	・・・

FIG.6

130

PERSONAL ID	DEPARTURE LOCATION	DESTINATION LOCATION	RESULTS	WORKING HOURS	ATTRIBUTE				
					SEX	ADDRESS	OCCUPATION	DELIVERABLE CAPACITY	DELIVERY MEANS
1001	AA CITY ○○ TOWN	BB CITY × × WARD	10 TIMES	16:00–20:00	MALE	AA CITY ○○ TOWN	STUDENT	10 KG	BICYCLE
1002	BB CITY × × WARD	BB CITY △△ WARD	5 TIMES	10:00–13:00	FEMALE	BB CITY × × WARD	HOMEMAKER	2 KG	ON FOOT
1003	...	...	...	...	...	...	...	...	...

FIG.7

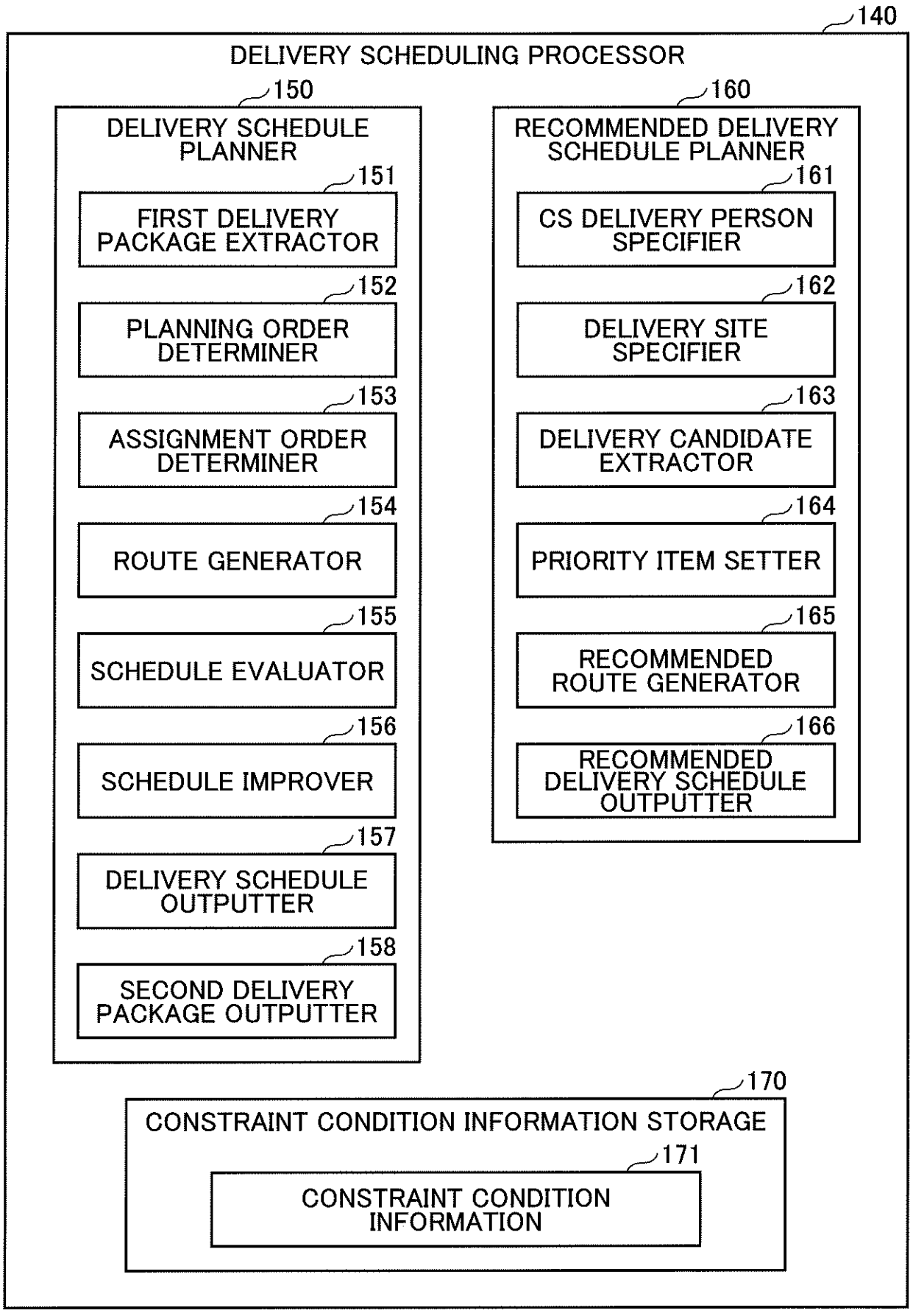

140
DELIVERY SCHEDULING PROCESSOR
150
DELIVERY SCHEDULE PLANNER
151
FIRST DELIVERY PACKAGE EXTRACTOR
152
PLANNING ORDER DETERMINER
153
ASSIGNMENT ORDER DETERMINER
154
ROUTE GENERATOR
155
SCHEDULE EVALUATOR
156
SCHEDULE IMPROVER
157
DELIVERY SCHEDULE OUTPUTTER
158
SECOND DELIVERY PACKAGE OUTPUTTER
160
RECOMMENDED DELIVERY SCHEDULE PLANNER
161
CS DELIVERY PERSON SPECIFIER
162
DELIVERY SITE SPECIFIER
163
DELIVERY CANDIDATE EXTRACTOR
164
PRIORITY ITEM SETTER
165
RECOMMENDED ROUTE GENERATOR
166
RECOMMENDED DELIVERY SCHEDULE OUTPUTTER
170
CONSTRAINT CONDITION INFORMATION STORAGE
171
CONSTRAINT CONDITION INFORMATION

FIG.8

171

CONDITIONAL ITEM	CONTENTS	DELIVERY SCHEDULE	RECOMMENDED DELIVERY SCHEDULE
ACCEPTABLE LOADING TIME	ACCEPTABLE LOADING START TIME≦LOADING START TIME, and ACCEPTABLE LOADING END TIME≧LOADING END TIME	SET	SET
ACCEPTABLE UNLOADING TIME	ACCEPTABLE UNLOADING START TIME≦UNLOADING START TIME, and ACCEPTABLE UNLOADING END TIME≧UNLOADING END TIME	SET	SET
AREA CONSTRAINT	(CASE OF DELIVERY) UNLOADING LOCATION⊆CONTRACTED AREA (CASE OF PICKUP) LOADING LOCATION⊆CONTRACTED AREA, and UNLOADING LOCATION⊆CONTRACTED AREA	SET	NOT SET
DELIVERABLE WEIGHT DELIVERABLE VOLUME DELIVERABLE NUMBER OF PACKAGES	TOTAL WEIGHT OF PACKAGES LOADED SIMULTANEOUSLY≦ DELIVERABLE WEIGHT, and TOTAL VOLUME OF PACKAGES LOADED SIMULTANEOUSLY≦ DELIVERABLE VOLUME, and TOTAL NUMBER OF PACKAGES LOADED SIMULTANEOUSLY≦ DELIVERABLE NUMBER OF PACKAGES	SET	SET
ACCEPTABLE WORKING TIME	ACCEPTABLE WORKING START TIME≦WORKING START TIME, and ACCEPTABLE WORKING END TIME≧WORKING END TIME	SET	SET

FIG.9

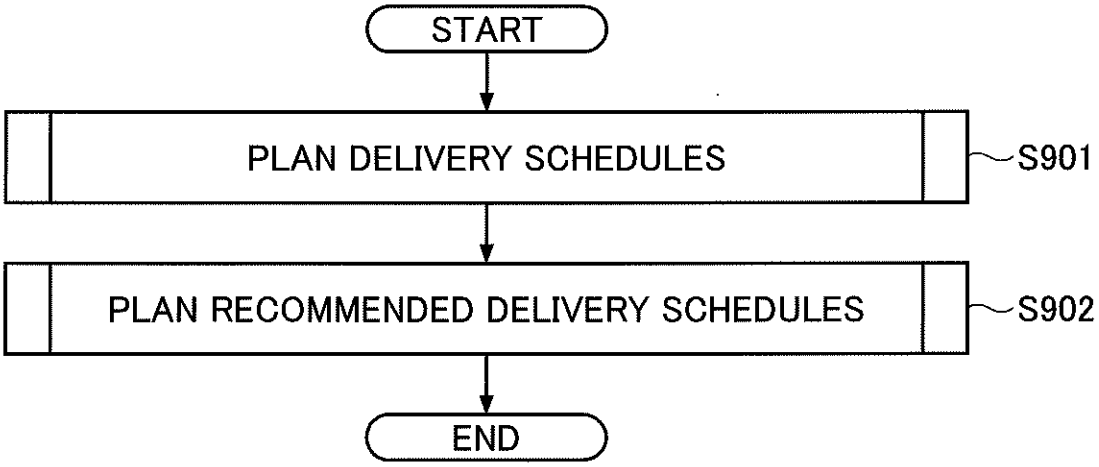

START
PLAN DELIVERY SCHEDULES
S901
PLAN RECOMMENDED DELIVERY SCHEDULES
S902
END

FIG.10

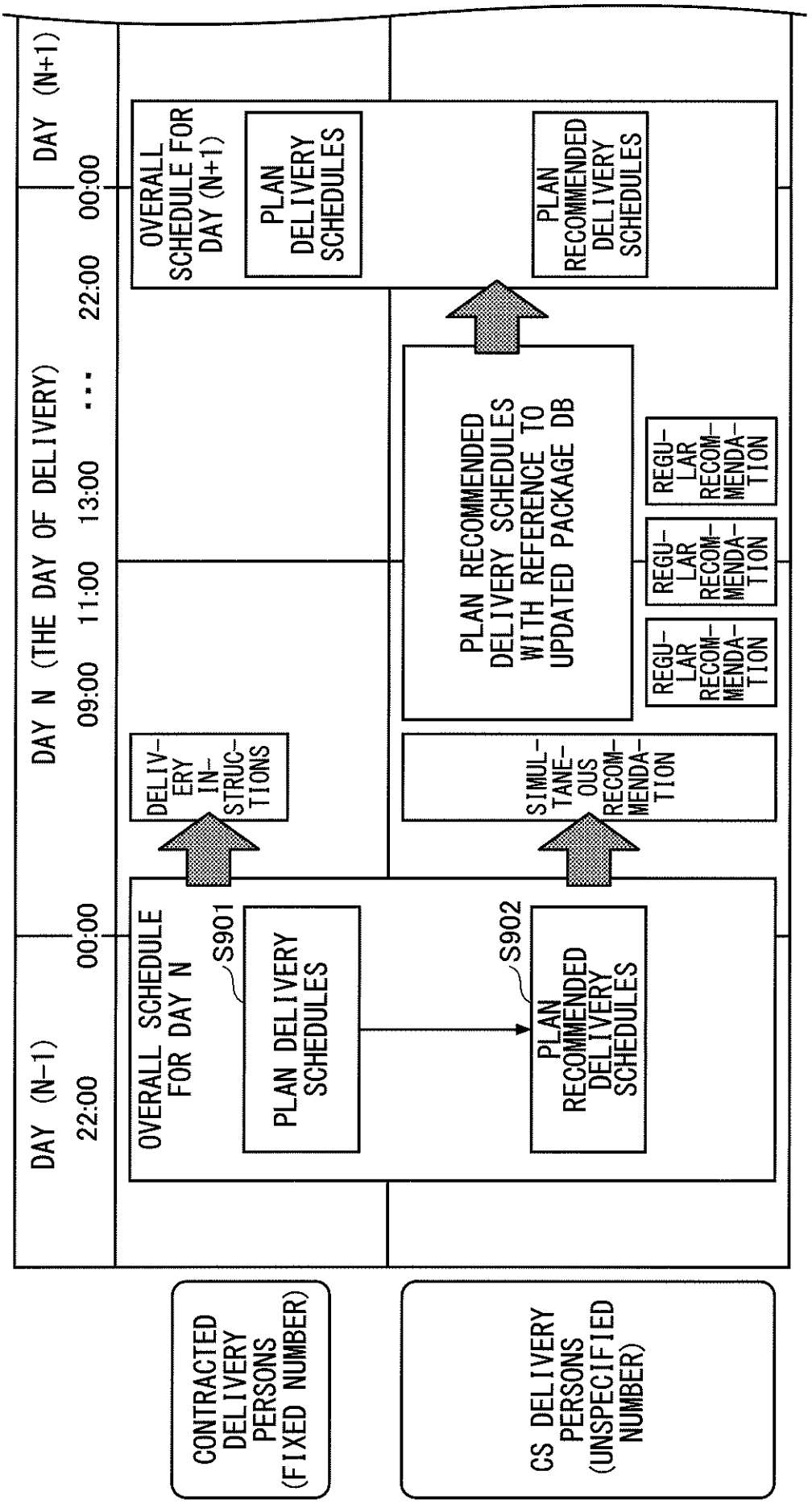

DAY (N-1)
22:00
00:00
DAY N (THE DAY OF DELIVERY)
09:00
11:00
13:00
・・・
22:00
00:00
DAY (N+1)
OVERALL SCHEDULE FOR DAY N
S901
PLAN DELIVERY SCHEDULES
S902
PLAN RECOMMENDED DELIVERY SCHEDULES
DELIV-ERY IN-STRUC-TIONS
SIMUL-TANE-OUS RECOM-MENDA-TION
PLAN RECOMMENDED DELIVERY SCHEDULES WITH REFERENCE TO UPDATED PACKAGE DB
REGU-LAR RECOM-MENDA-TION
REGU-LAR RECOM-MENDA-TION
REGU-LAR RECOM-MENDA-TION
OVERALL SCHEDULE FOR DAY (N+1)
PLAN DELIVERY SCHEDULES
PLAN RECOMMENDED DELIVERY SCHEDULES
CONTRACTED DELIVERY PERSONS (FIXED NUMBER)
CS DELIVERY PERSONS (UNSPECIFIED NUMBER)

FIG.11

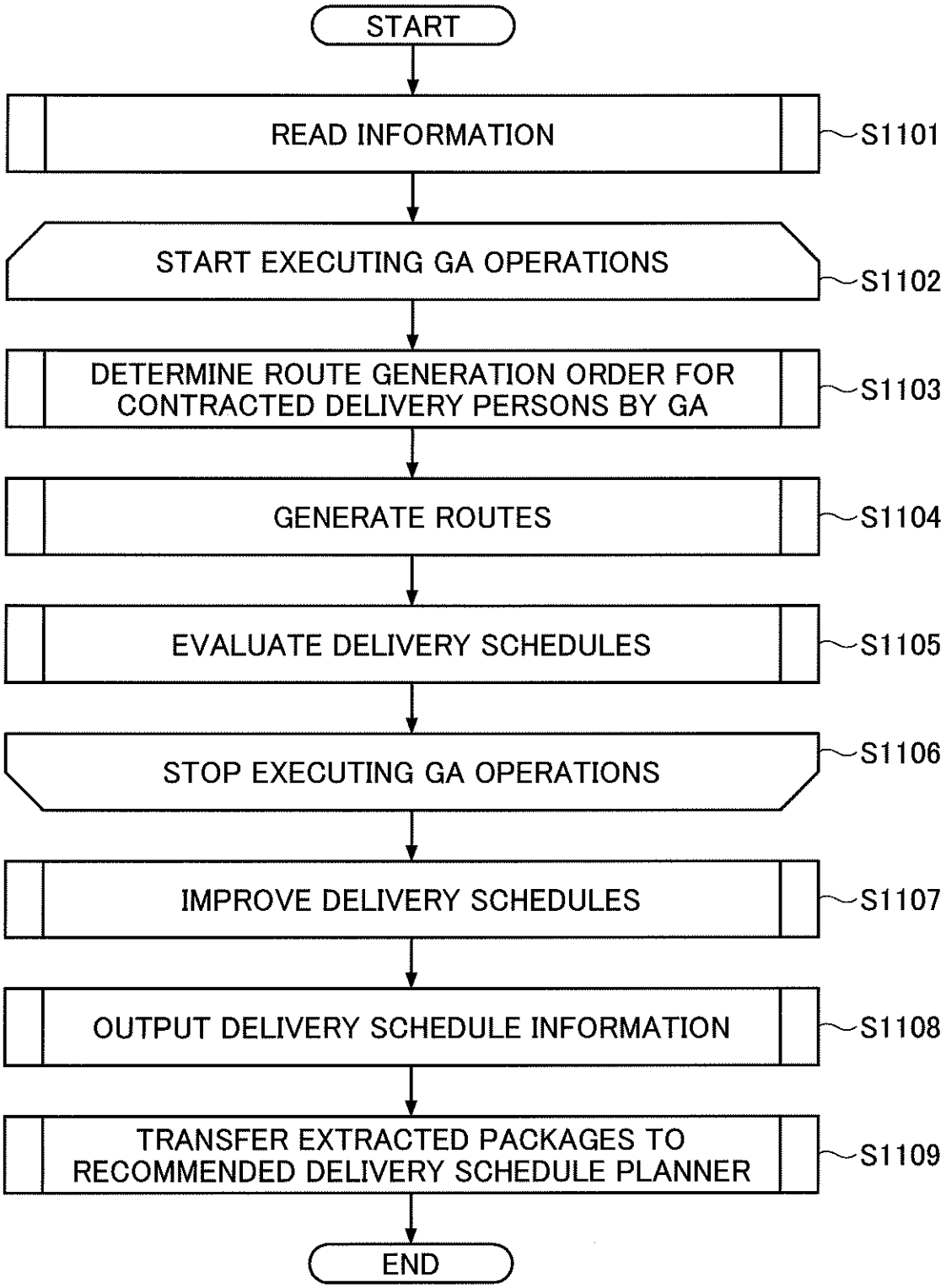

START
READ INFORMATION
S1101
START EXECUTING GA OPERATIONS
S1102
DETERMINE ROUTE GENERATION ORDER FOR CONTRACTED DELIVERY PERSONS BY GA
S1103
GENERATE ROUTES
S1104
EVALUATE DELIVERY SCHEDULES
S1105
STOP EXECUTING GA OPERATIONS
S1106
IMPROVE DELIVERY SCHEDULES
S1107
OUTPUT DELIVERY SCHEDULE INFORMATION
S1108
TRANSFER EXTRACTED PACKAGES TO RECOMMENDED DELIVERY SCHEDULE PLANNER
S1109
END

FIG.12

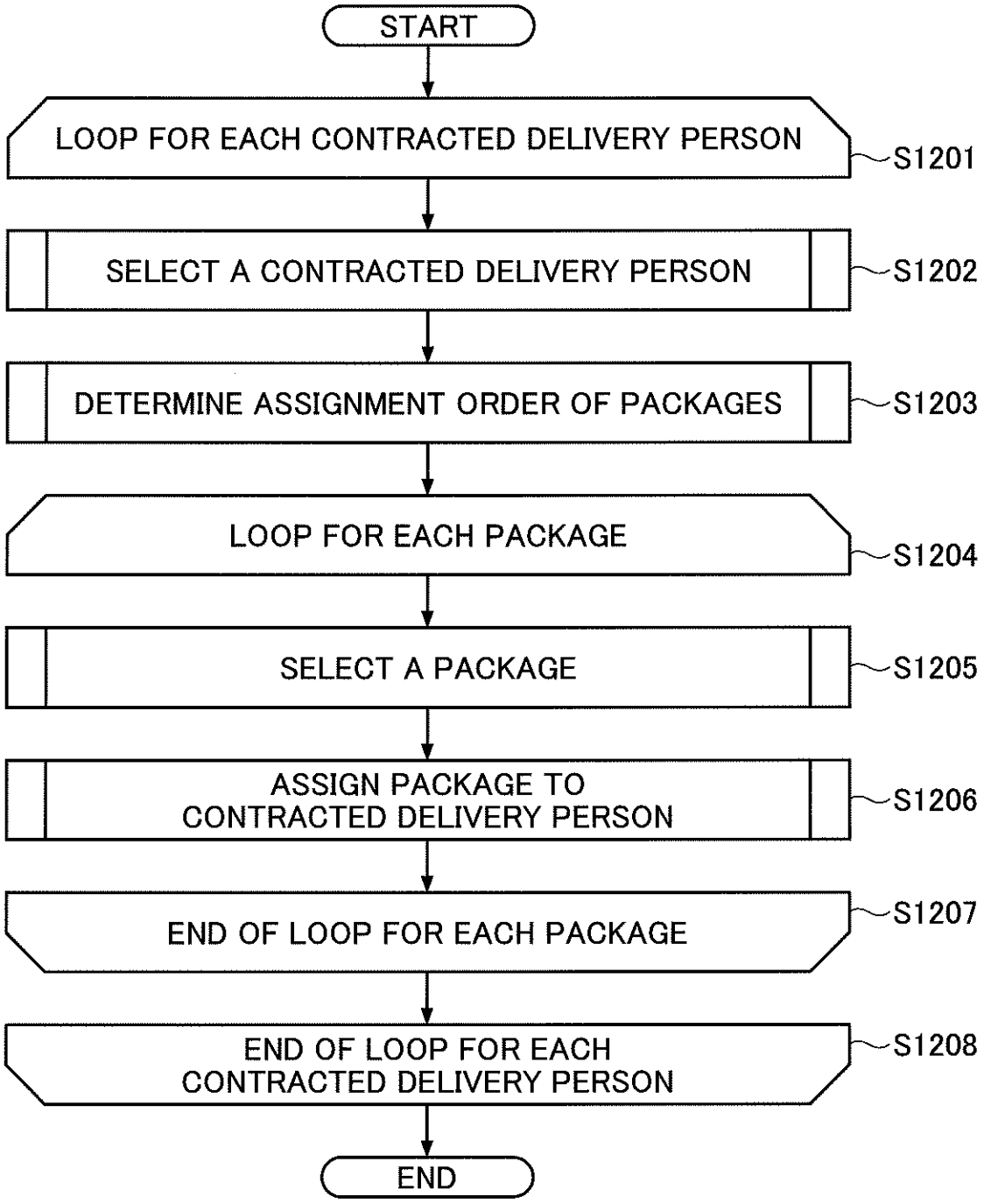

START
LOOP FOR EACH CONTRACTED DELIVERY PERSON
S1201
SELECT A CONTRACTED DELIVERY PERSON
S1202
DETERMINE ASSIGNMENT ORDER OF PACKAGES
S1203
LOOP FOR EACH PACKAGE
S1204
SELECT A PACKAGE
S1205
ASSIGN PACKAGE TO CONTRACTED DELIVERY PERSON
S1206
END OF LOOP FOR EACH PACKAGE
S1207
END OF LOOP FOR EACH CONTRACTED DELIVERY PERSON
S1208
END

FIG.13A

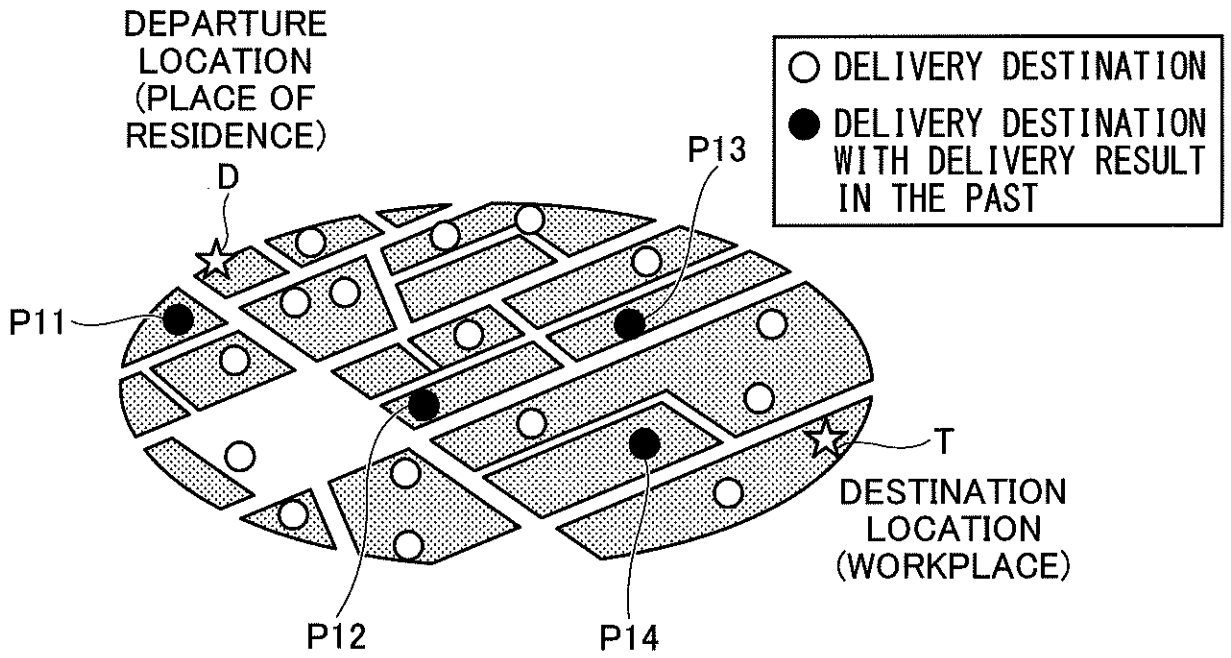

DEPARTURE LOCATION (PLACE OF RESIDENCE)
D
P11
P12
P13
P14
T
DESTINATION LOCATION (WORKPLACE)
DELIVERY DESTINATION
DELIVERY DESTINATION WITH DELIVERY RESULT IN THE PAST

FIG.13B

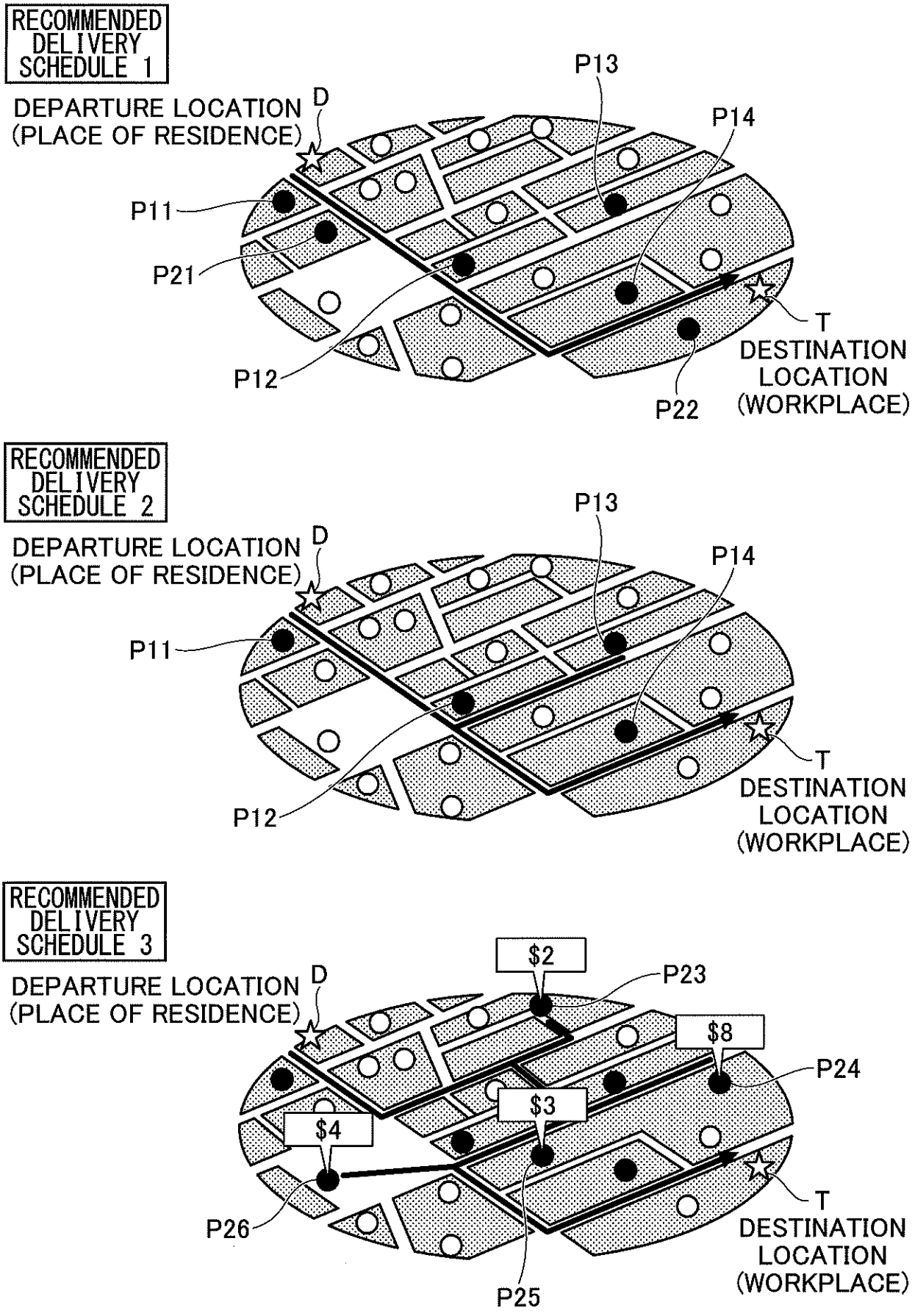

RECOMMENDED DELIVERY SCHEDULE 1
DEPARTURE LOCATION (PLACE OF RESIDENCE)
D
P11
P21
P12
P13
P14
P22
T
DESTINATION LOCATION (WORKPLACE)
RECOMMENDED DELIVERY SCHEDULE 2
DEPARTURE LOCATION (PLACE OF RESIDENCE)
D
P11
P12
P13
P14
T
DESTINATION LOCATION (WORKPLACE)
RECOMMENDED DELIVERY SCHEDULE 3
DEPARTURE LOCATION (PLACE OF RESIDENCE)
D
$2
P23
$8
P24
$3
$4
P26
P25
T
DESTINATION LOCATION (WORKPLACE)

FIG.14

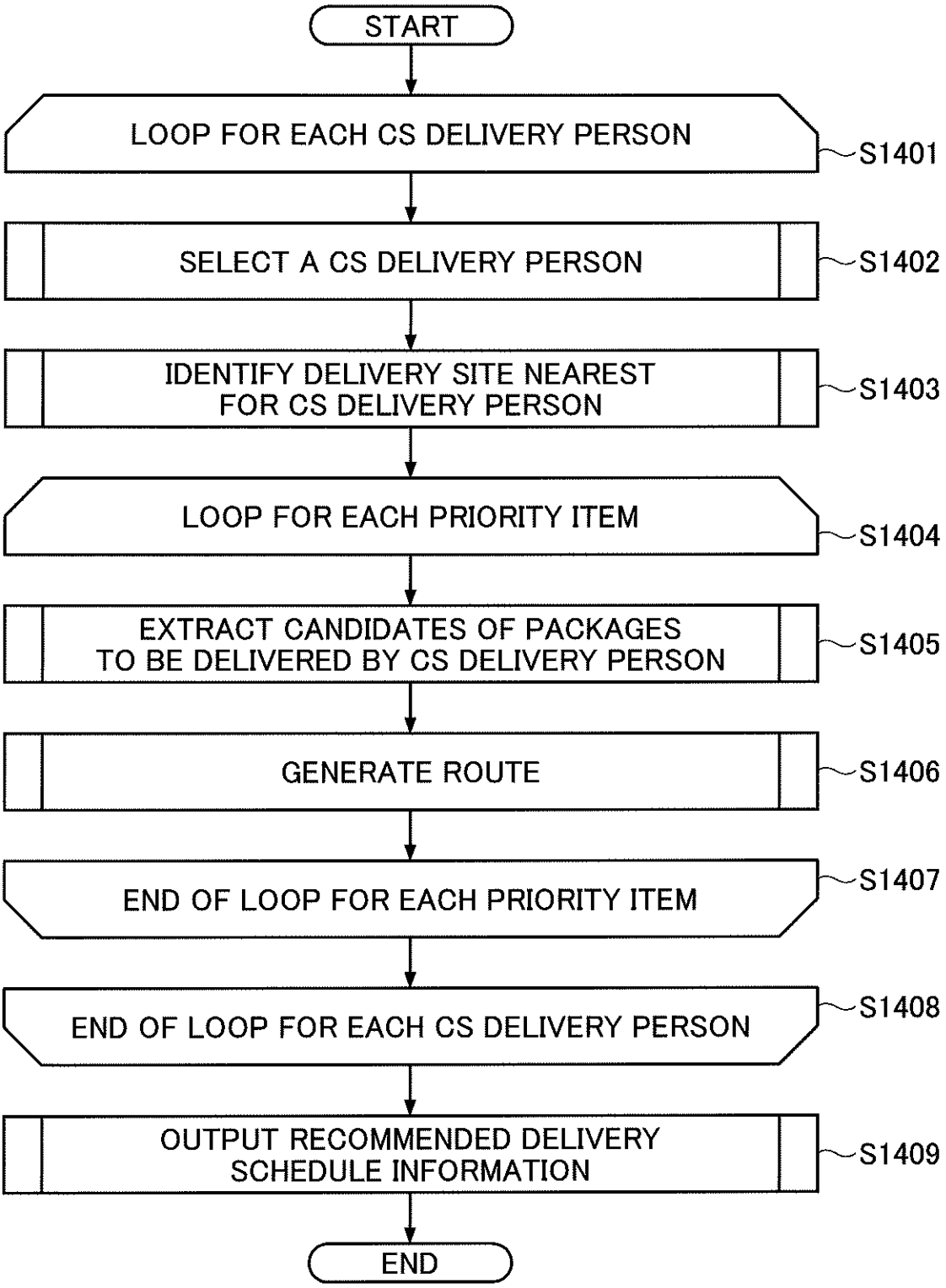

START
LOOP FOR EACH CS DELIVERY PERSON
S1401
SELECT A CS DELIVERY PERSON
S1402
IDENTIFY DELIVERY SITE NEAREST FOR CS DELIVERY PERSON
S1403
LOOP FOR EACH PRIORITY ITEM
S1404
EXTRACT CANDIDATES OF PACKAGES TO BE DELIVERED BY CS DELIVERY PERSON
S1405
GENERATE ROUTE
S1406
END OF LOOP FOR EACH PRIORITY ITEM
S1407
END OF LOOP FOR EACH CS DELIVERY PERSON
S1408
OUTPUT RECOMMENDED DELIVERY SCHEDULE INFORMATION
S1409
END

FIG.15

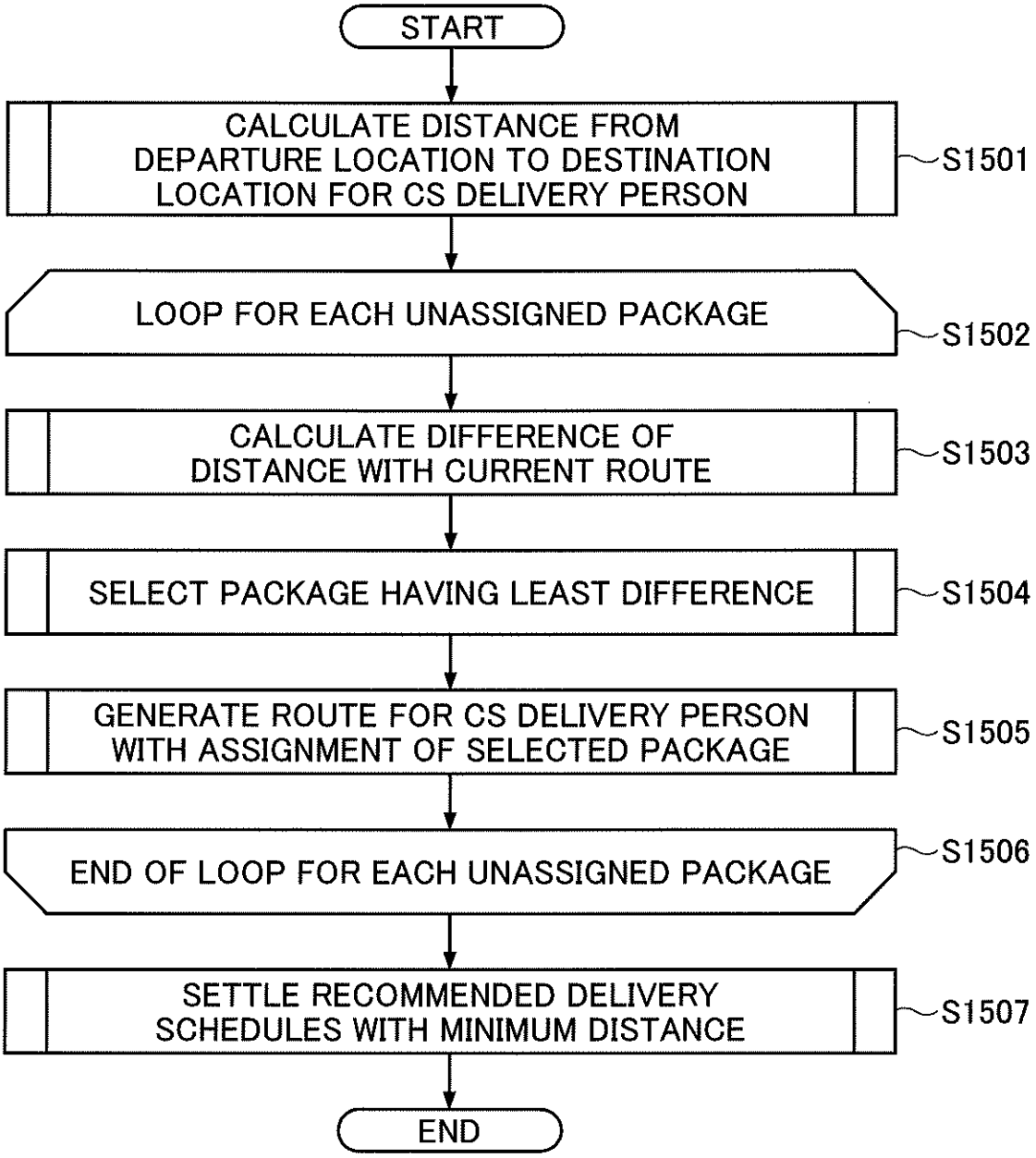

START
CALCULATE DISTANCE FROM DEPARTURE LOCATION TO DESTINATION LOCATION FOR CS DELIVERY PERSON
S1501
LOOP FOR EACH UNASSIGNED PACKAGE
S1502
CALCULATE DIFFERENCE OF DISTANCE WITH CURRENT ROUTE
S1503
SELECT PACKAGE HAVING LEAST DIFFERENCE
S1504
GENERATE ROUTE FOR CS DELIVERY PERSON WITH ASSIGNMENT OF SELECTED PACKAGE
S1505
END OF LOOP FOR EACH UNASSIGNED PACKAGE
S1506
SETTLE RECOMMENDED DELIVERY SCHEDULES WITH MINIMUM DISTANCE
S1507
END

FIG.16

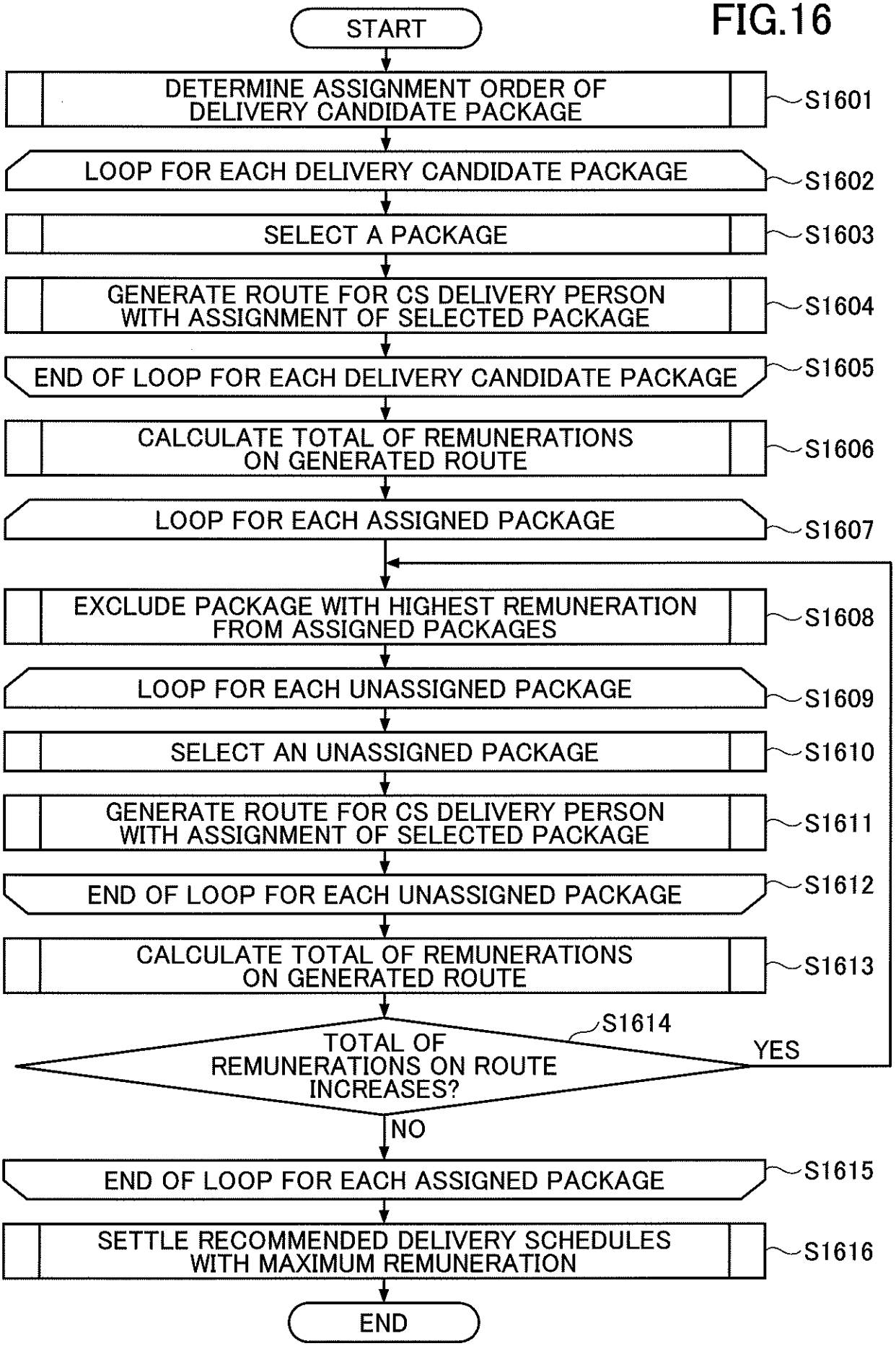

START
DETERMINE ASSIGNMENT ORDER OF DELIVERY CANDIDATE PACKAGE
S1601
LOOP FOR EACH DELIVERY CANDIDATE PACKAGE
S1602
SELECT A PACKAGE
S1603
GENERATE ROUTE FOR CS DELIVERY PERSON WITH ASSIGNMENT OF SELECTED PACKAGE
S1604
END OF LOOP FOR EACH DELIVERY CANDIDATE PACKAGE
S1605
CALCULATE TOTAL OF REMUNERATIONS ON GENERATED ROUTE
S1606
LOOP FOR EACH ASSIGNED PACKAGE
S1607
EXCLUDE PACKAGE WITH HIGHEST REMUNERATION FROM ASSIGNED PACKAGES
S1608
LOOP FOR EACH UNASSIGNED PACKAGE
S1609
SELECT AN UNASSIGNED PACKAGE
S1610
GENERATE ROUTE FOR CS DELIVERY PERSON WITH ASSIGNMENT OF SELECTED PACKAGE
S1611
END OF LOOP FOR EACH UNASSIGNED PACKAGE
S1612
CALCULATE TOTAL OF REMUNERATIONS ON GENERATED ROUTE
S1613
TOTAL OF REMUNERATIONS ON ROUTE INCREASES?
S1614
YES
NO
END OF LOOP FOR EACH ASSIGNED PACKAGE
S1615
SETTLE RECOMMENDED DELIVERY SCHEDULES WITH MAXIMUM REMUNERATION
S1616
END

FIG.17

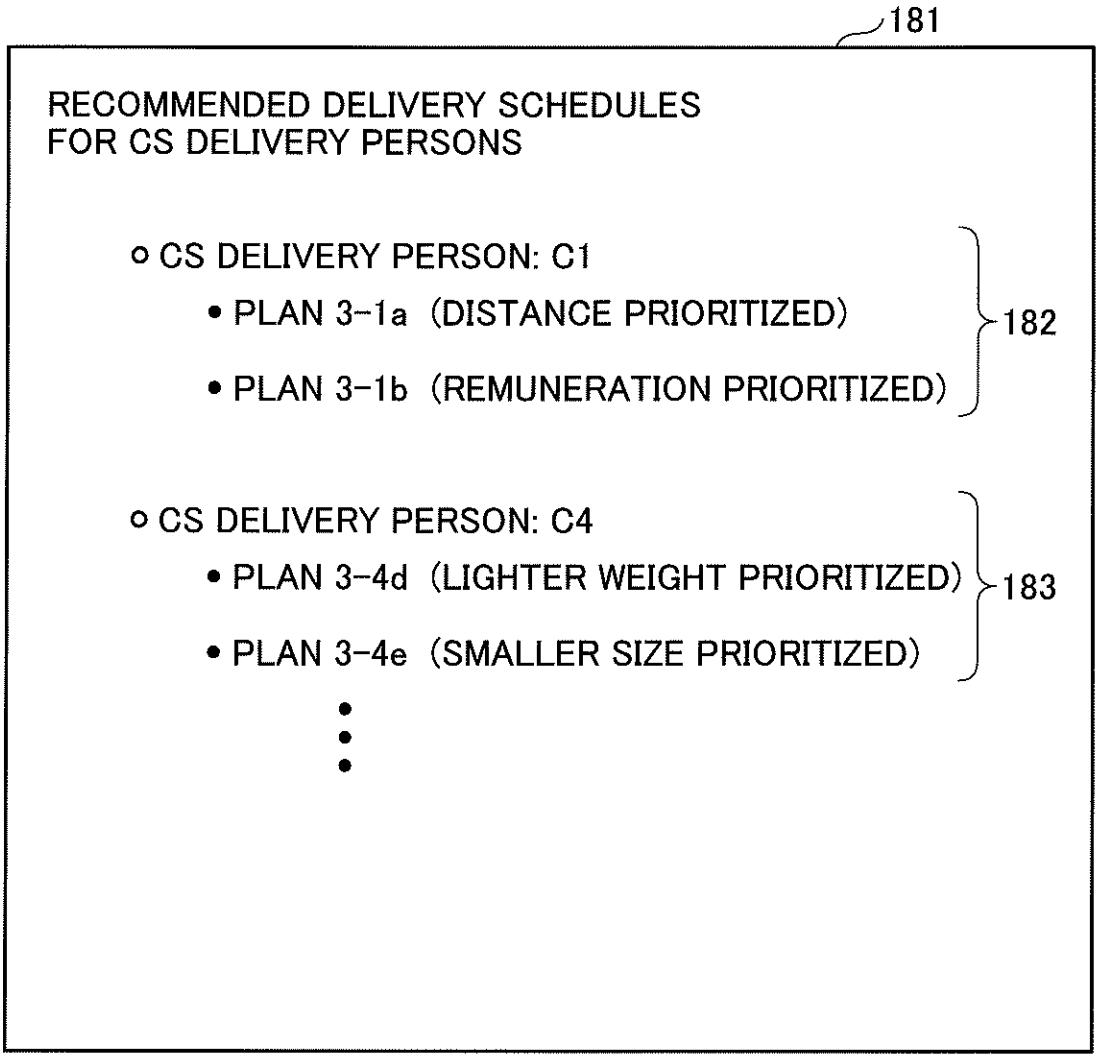

181
RECOMMENDED DELIVERY SCHEDULES
FOR CS DELIVERY PERSONS
CS DELIVERY PERSON: C1
PLAN 3-1a (DISTANCE PRIORITIZED)
PLAN 3-1b (REMUNERATION PRIORITIZED)
182
CS DELIVERY PERSON: C4
PLAN 3-4d (LIGHTER WEIGHT PRIORITIZED)
PLAN 3-4e (SMALLER SIZE PRIORITIZED)
183

FIG.18

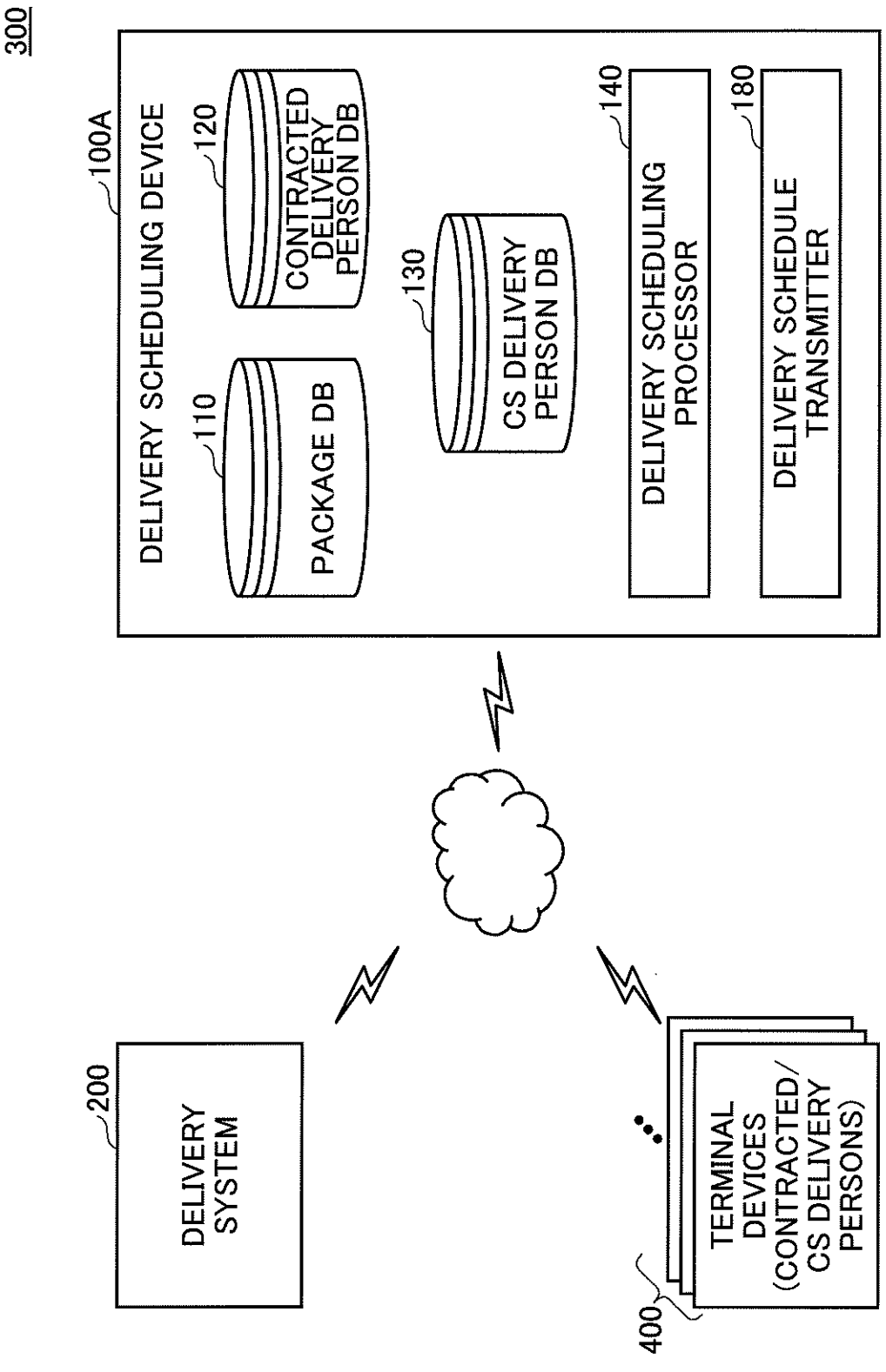
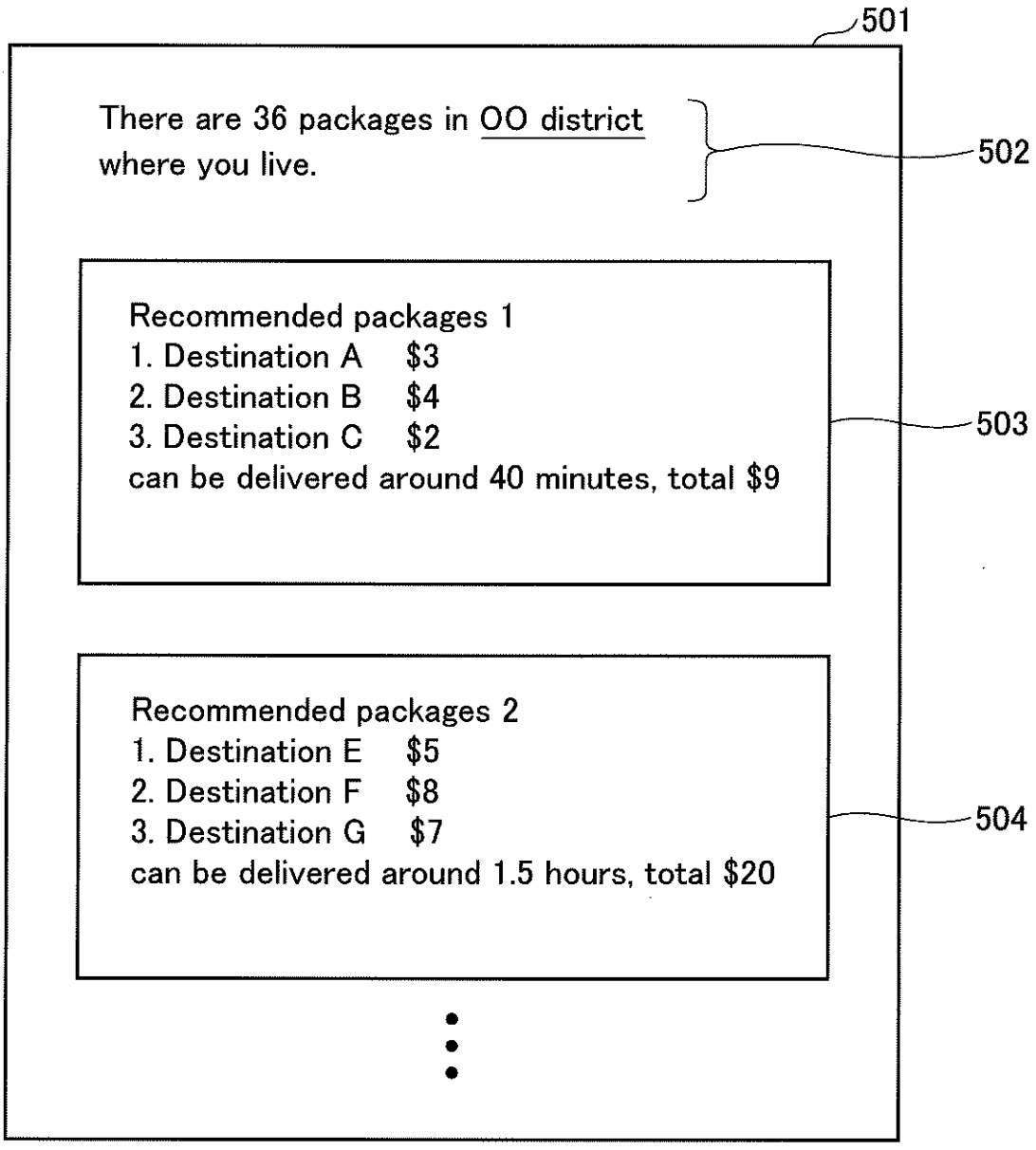

300
100A
DELIVERY SCHEDULING DEVICE
110
PACKAGE DB
120
CONTRACTED DELIVERY PERSON DB
130
CS DELIVERY PERSON DB
140
DELIVERY SCHEDULING PROCESSOR
180
DELIVERY SCHEDULE TRANSMITTER
200
DELIVERY SYSTEM
400
TERMINAL DEVICES (CONTRACTED/ CS DELIVERY PERSONS)

FIG.19


501
There are 36 packages in OO district where you live.
502
Recommended packages 1
1. Destination A $3
2. Destination B $4
3. Destination C $2
can be delivered around 40 minutes, total $9
503
Recommended packages 2
1. Destination E $5
2. Destination F $8
3. Destination G $7
can be delivered around 1.5 hours, total $20
504