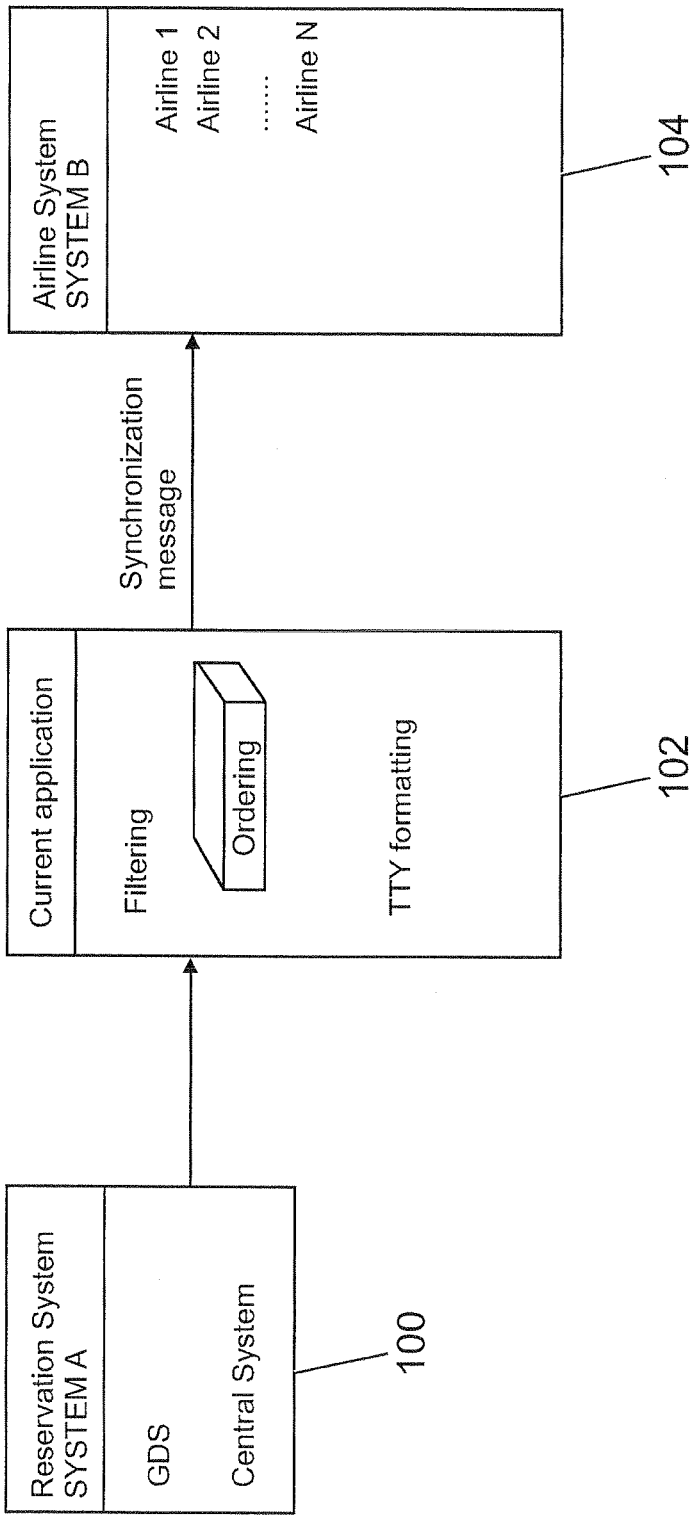

Reservation System
SYSTEM A
GDS
Central System
100
Current application
Filtering
Ordering
TTY formatting
102
Synchronization
message
Airline System
SYSTEM B
Airline 1
Airline 2
.....
Airline N
104

Fig. 1

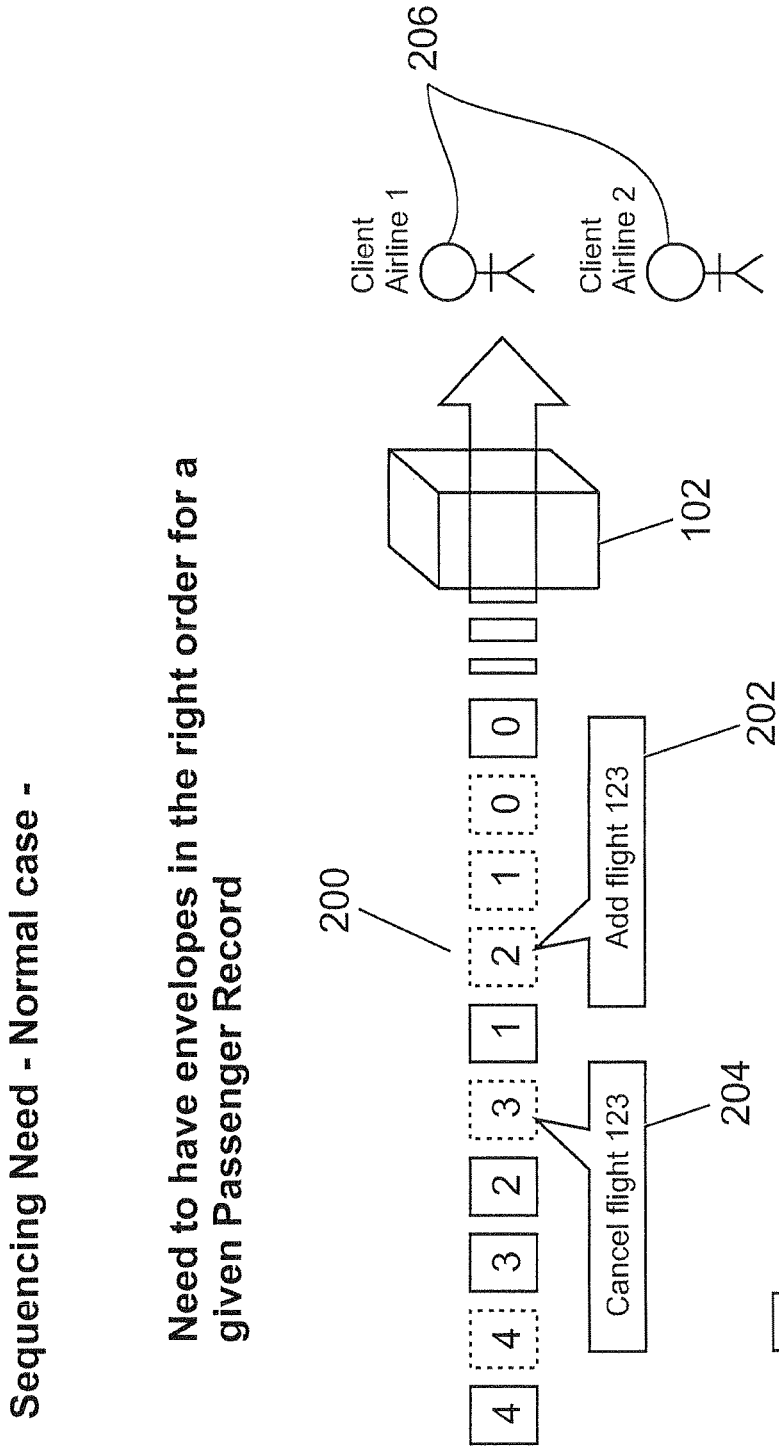

Sequencing Need - Normal case -
Need to have envelopes in the right order for a given Passenger Record
200
4
4
3
2
3
1
2
1
0
0
Cancel flight 123
204
Add flight 123
202
102
206
Client Airline 1
Client Airline 2
4
Record AAAAAA envelope 4
4
Record BBBBBB envelope 4

Fig. 2

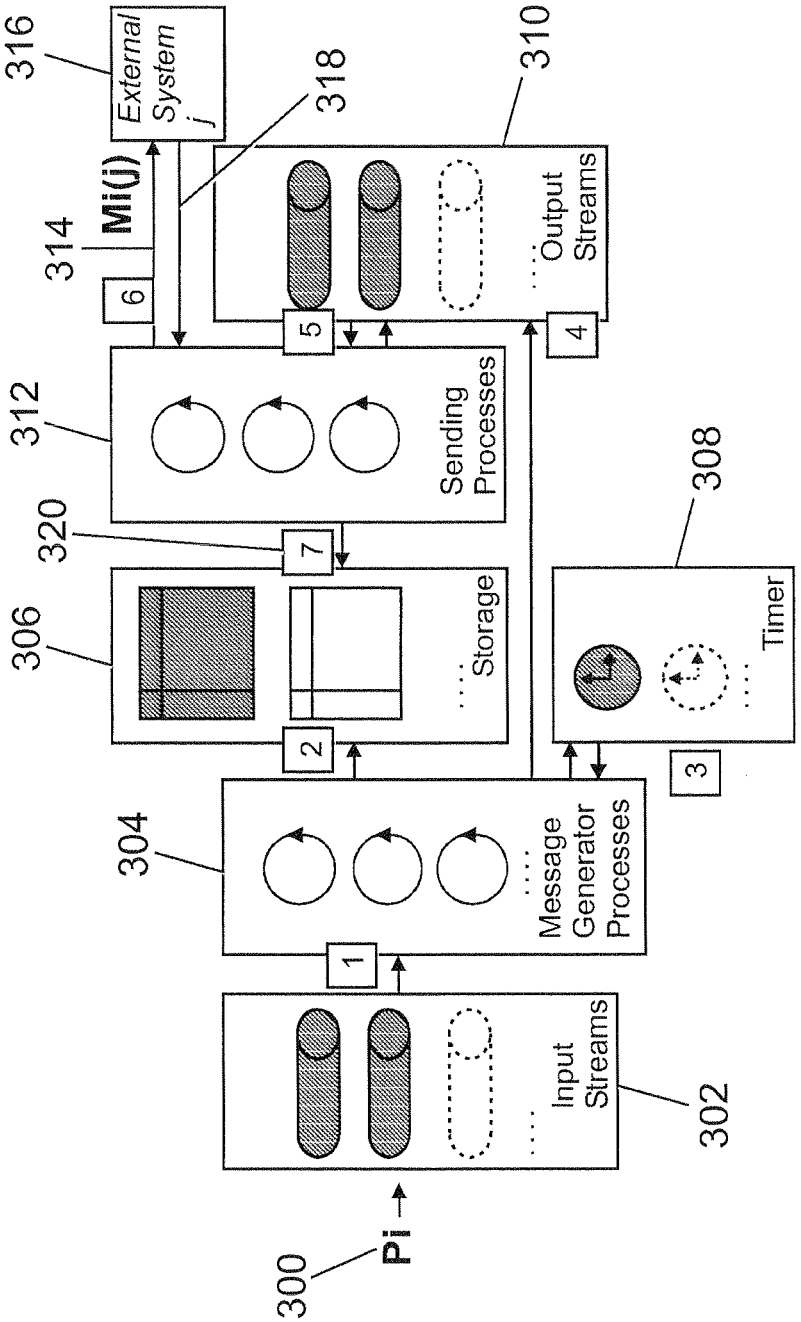

316
External System j
318
310
Mi(j)
314
6
Output Streams
5
4
312
Sending Processes
320
7
308
306
Storage
Timer
2
3
304
Message Generator Processes
1
Input Streams
302
Pi
300

Fig. 3

Line Number	Message reference	Dependency
N	M9(j)	
N + 1	M10(j)	Line N

Fig. 4

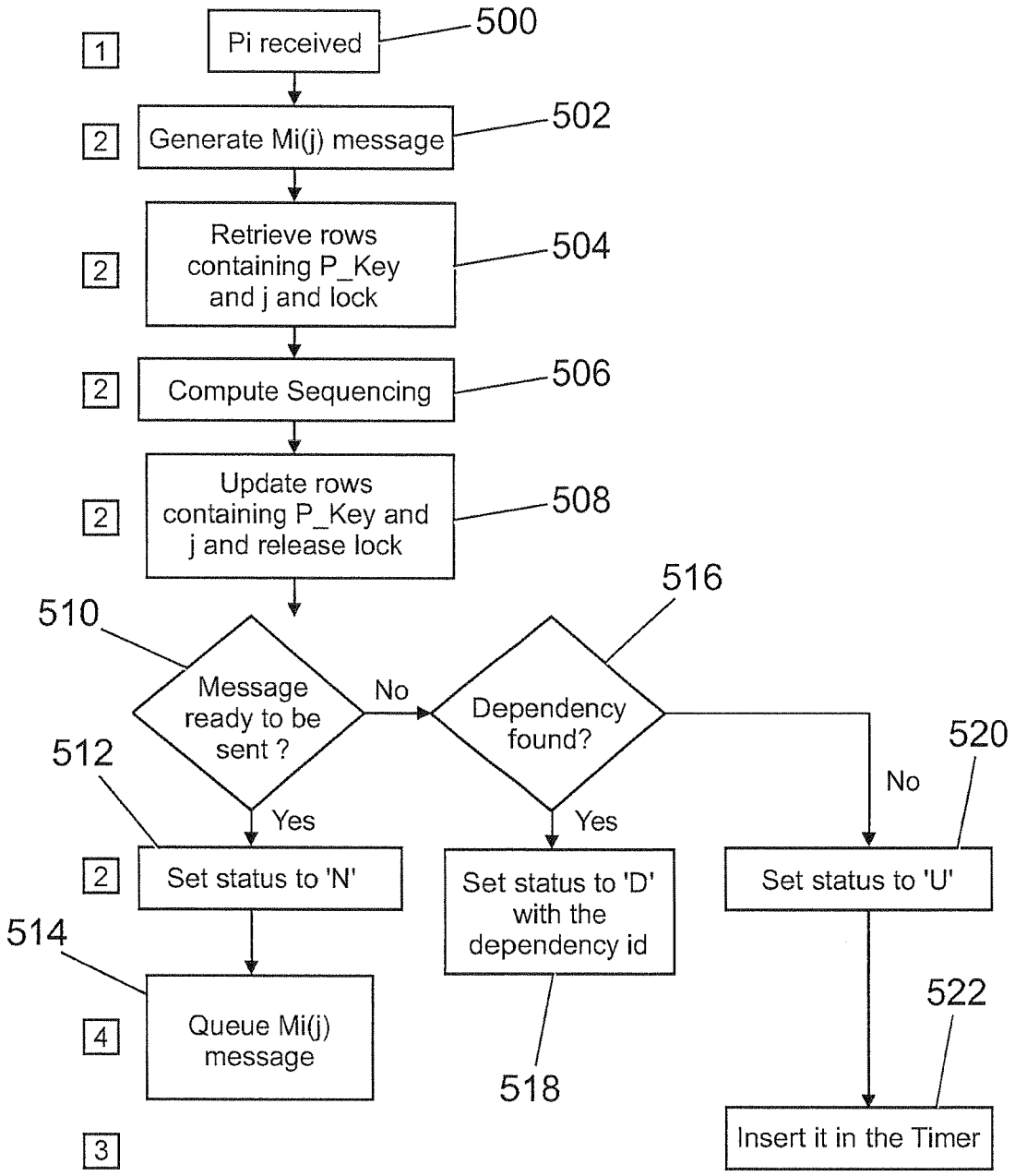

1
Pi received
500
2
Generate Mi(j) message
502
2
Retrieve rows containing P_Key and j and lock
504
2
Compute Sequencing
506
2
Update rows containing P_Key and j and release lock
508
510
Message ready to be sent ?
No
516
Dependency found?
No
520
512
Yes
Yes
2
Set status to 'N'
Set status to 'D' with the dependency id
Set status to 'U'
514
4
Queue Mi(j) message
518
522
3
Insert it in the Timer

Fig. 5

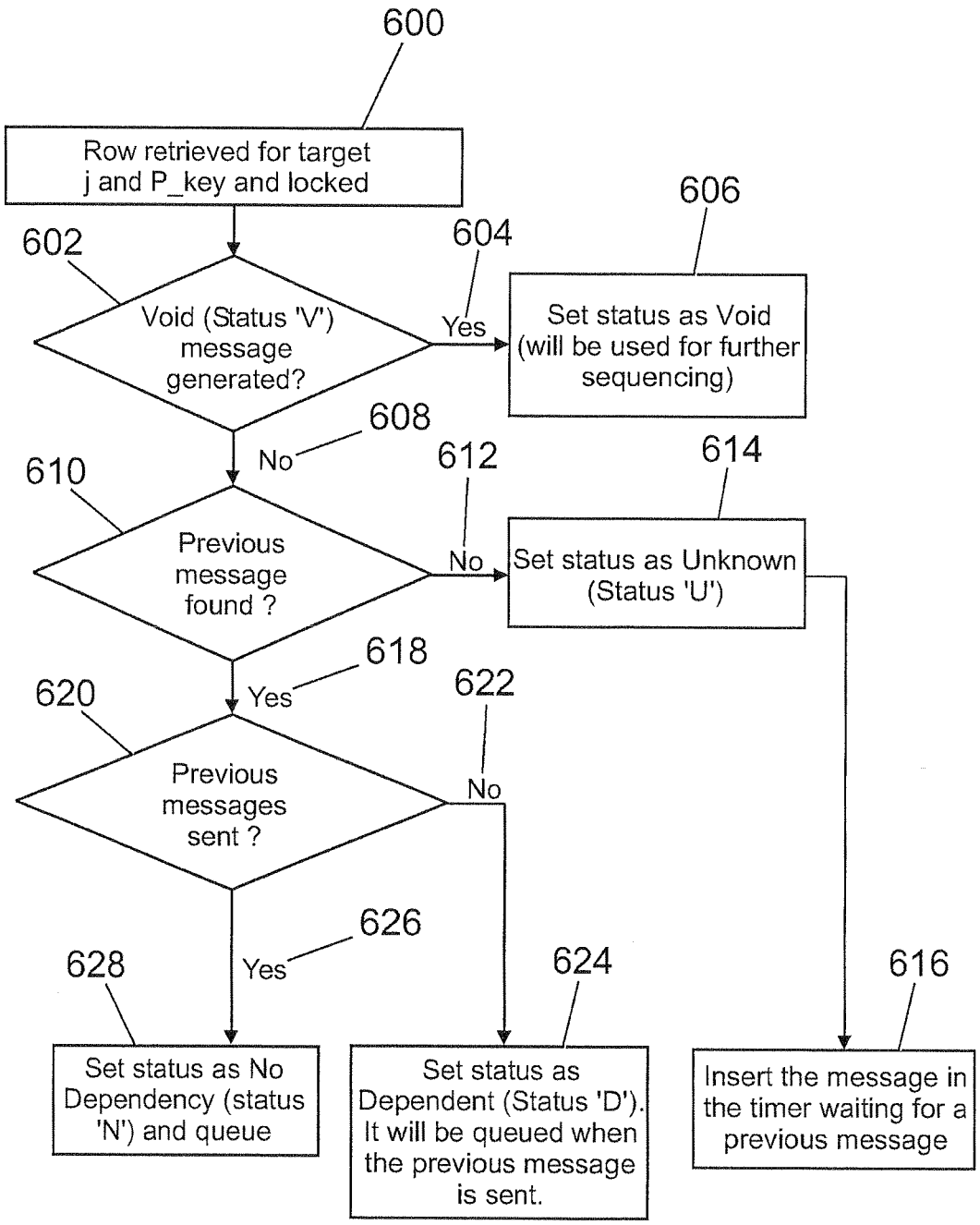

600
Row retrieved for target j and P_key and locked
602
Void (Status 'V') message generated?
604
Yes
606
Set status as Void (will be used for further sequencing)
608
No
610
Previous message found ?
612
No
614
Set status as Unknown (Status 'U')
618
Yes
620
Previous messages sent ?
622
No
626
Yes
628
Set status as No Dependency (status 'N') and queue
624
Set status as Dependent (Status 'D'). It will be queued when the previous message is sent.
616
Insert the message in the timer waiting for a previous message

Fig. 6

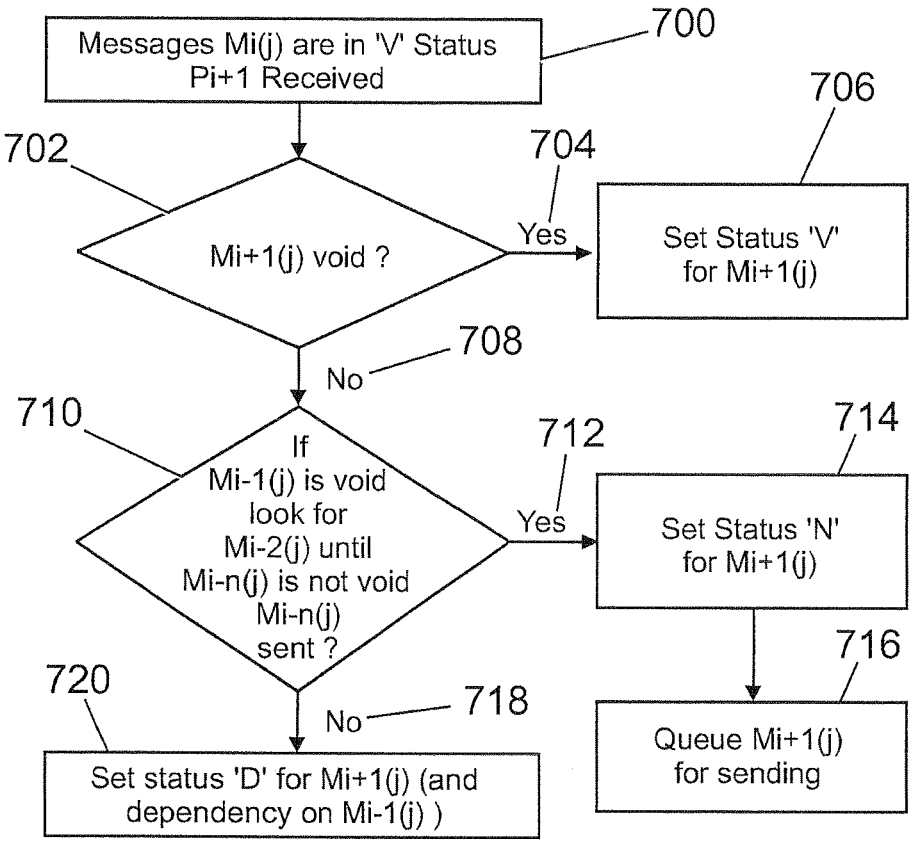

Messages Mi(j) are in 'V' Status
Pi+1 Received
700
706
702
704
Mi+1(j) void ?
Yes
Set Status 'V'
for Mi+1(j)
708
No
710
712
714
If
Mi-1(j) is void
look for
Mi-2(j) until
Mi-n(j) is not void
Mi-n(j)
sent ?
Yes
Set Status 'N'
for Mi+1(j)
716
720
718
No
Queue Mi+1(j)
for sending
Set status 'D' for Mi+1(j) (and
dependency on Mi-1(j))

Fig. 7

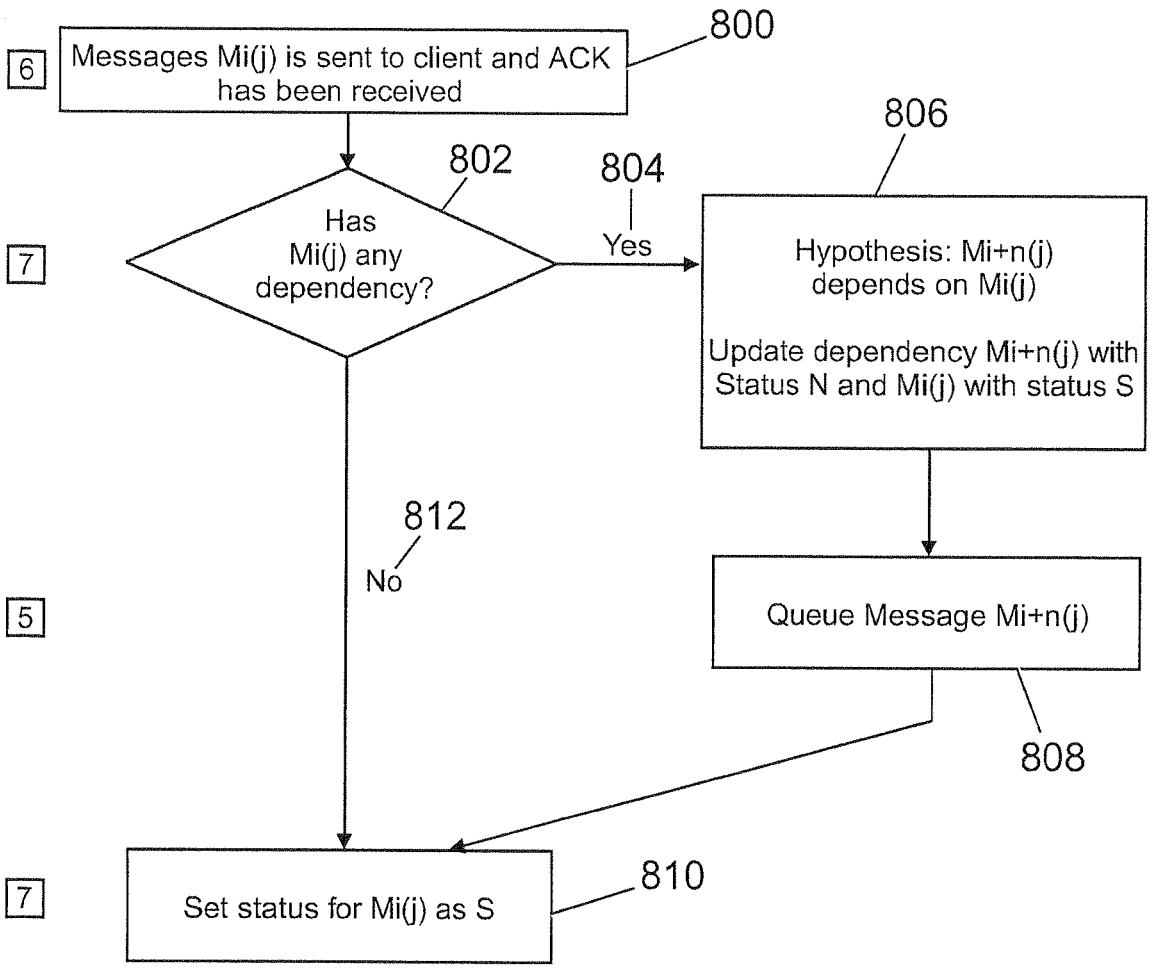
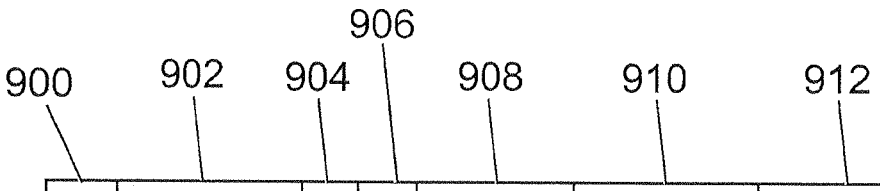

6
Messages Mi(j) is sent to client and ACK has been received
800
802
Has Mi(j) any dependency?
804
Yes
806
Hypothesis: Mi+n(j) depends on Mi(j)
Update dependency Mi+n(j) with Status N and Mi(j) with status S
7
812
No
5
Queue Message Mi+n(j)
808
7
Set status for Mi(j) as S
810

Fig. 8



ID	P_Key	i	j	Status	Dep_Id	Message
9	AAAAAA	0	1	S	Ø	M0(1)
10	AAAAAA	0	2	S	Ø	M0(2)
11	AAAAAA	1	1	V	Ø	Ø
12	AAAAAA	1	2	N	10	M1(2)
13	AAAAAA	2	1	N	9	M2(1)
14	AAAAAA	2	2	D	12	M2(2)
15	AAAAAA	3	1	D	13	M3(1)
16	BBBBBB	2	1	U	Ø	M'2(1)

Fig. 9

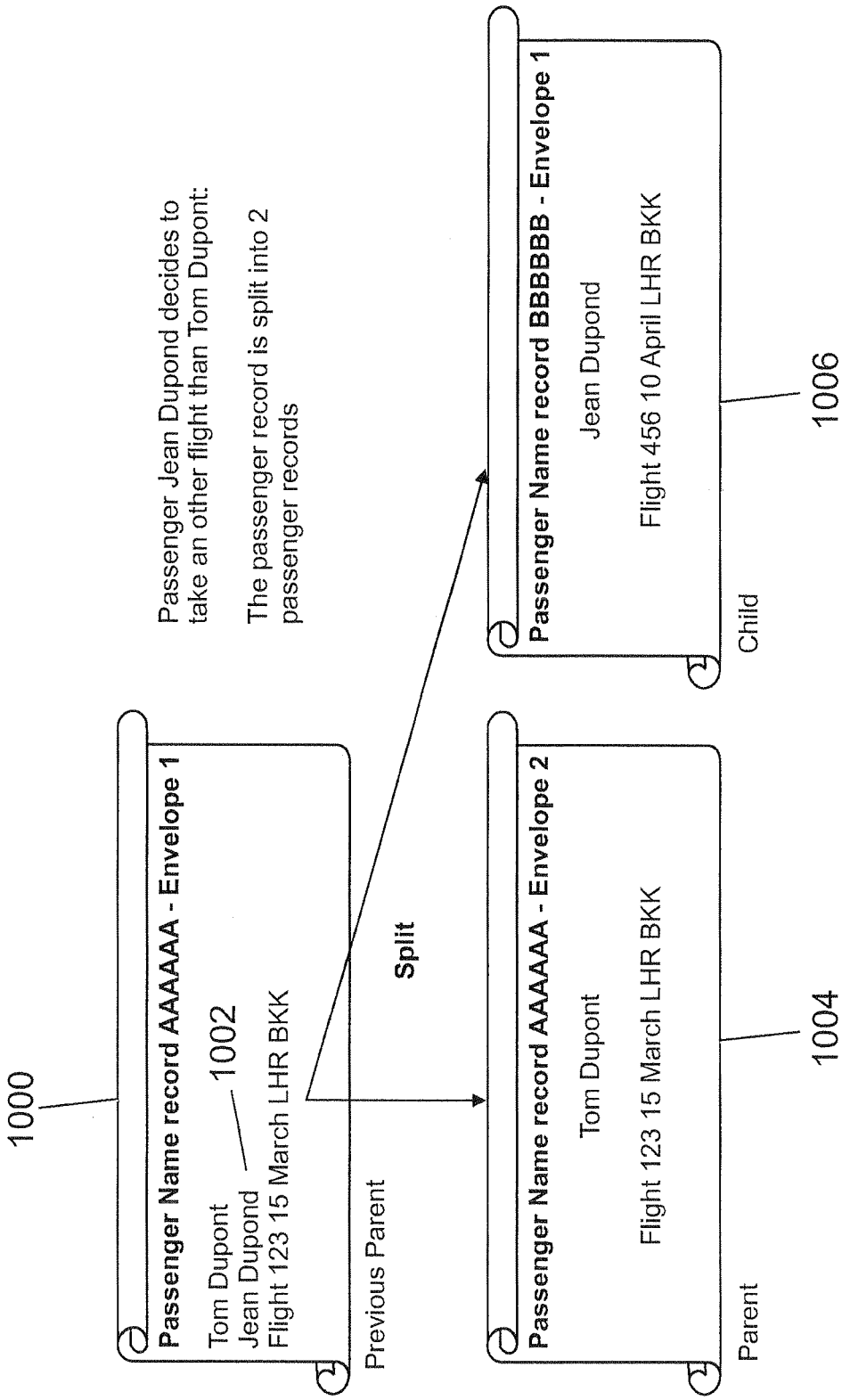

1000
Passenger Name record AAAAAA - Envelope 1
Tom Dupont
Jean Dupond
1002
Flight 123 15 March LHR BKK
Previous Parent
Passenger Jean Dupond decides to take an other flight than Tom Dupont:
The passenger record is split into 2 passenger records
Split
Passenger Name record AAAAAA - Envelope 2
Tom Dupont
Flight 123 15 March LHR BKK
Parent
1004
Passenger Name record BBBBBB - Envelope 1
Jean Dupond
Flight 456 10 April LHR BKK
Child
1006

Fig. 10

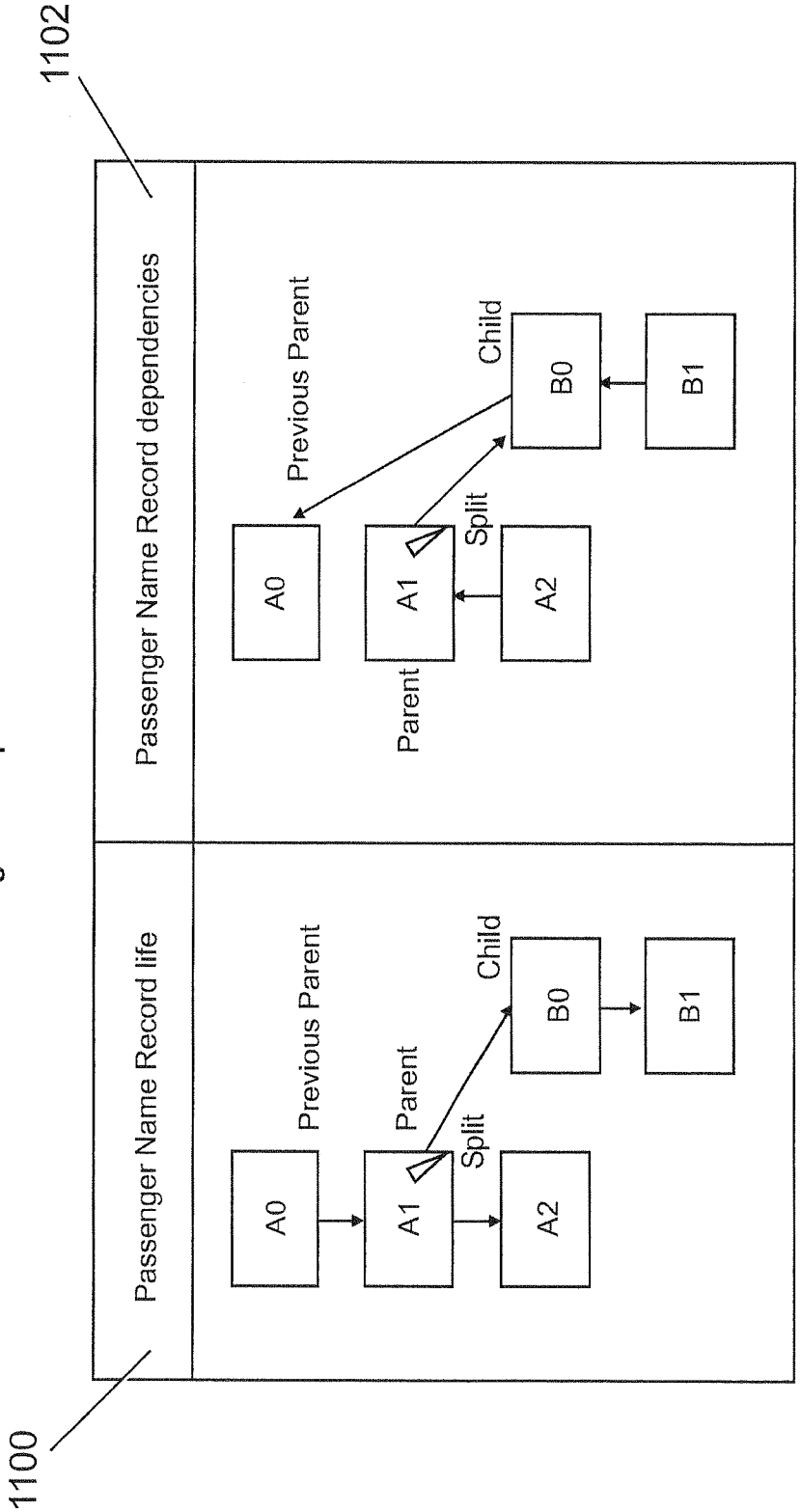
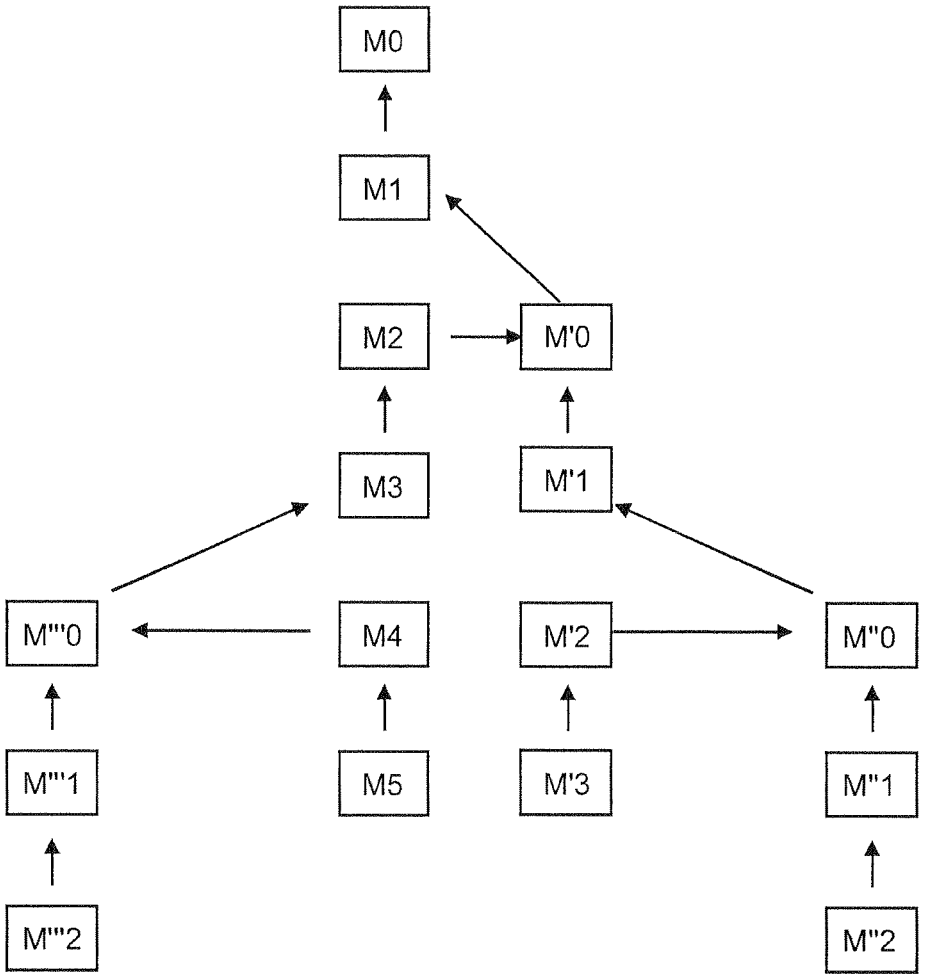

Sequencing Need - Split case -
A DVD (child split) message must come before the TTY message for its parent.
1102
1100
Passenger Name Record life
Passenger Name Record dependencies
A0
Previous Parent
A1
Parent
Split
A2
Child
B0
B1

Fig. 11



Legend:

M'0 : Message of family M', index 0.

Here the target or client is omitted to simplify the notation.

Fig. 12