**Fig.1**

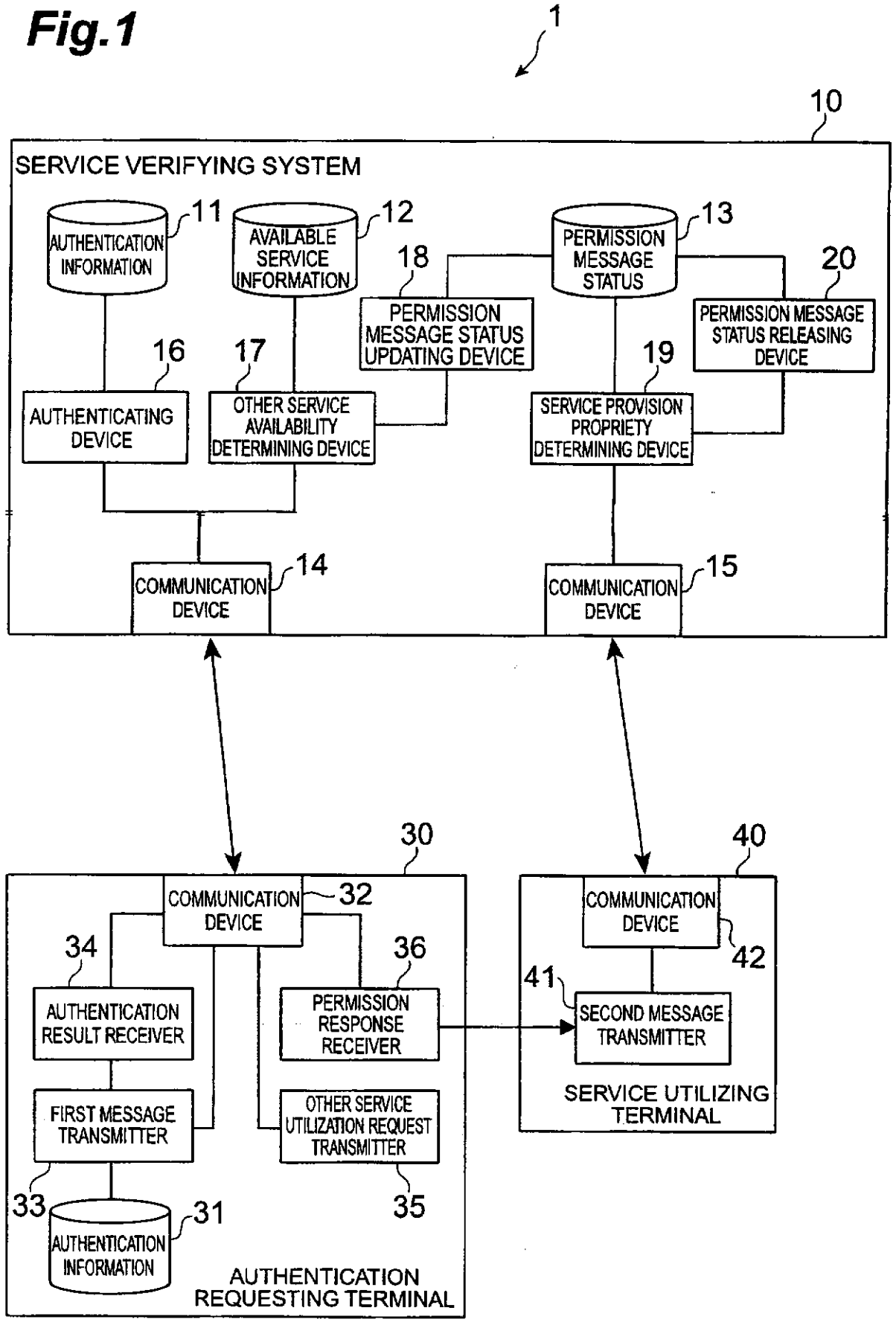

1
10
SERVICE VERIFYING SYSTEM
AUTHENTICATION INFORMATION
11
AVAILABLE SERVICE INFORMATION
12
PERMISSION MESSAGE STATUS
13
18
PERMISSION MESSAGE STATUS UPDATING DEVICE
20
PERMISSION MESSAGE STATUS RELEASING DEVICE
16
17
19
AUTHENTICATING DEVICE
OTHER SERVICE AVAILABILITY DETERMINING DEVICE
SERVICE PROVISION PROPRIETY DETERMINING DEVICE
COMMUNICATION DEVICE
14
COMMUNICATION DEVICE
15
30
40
COMMUNICATION DEVICE
32
COMMUNICATION DEVICE
42
34
36
41
AUTHENTICATION RESULT RECEIVER
PERMISSION RESPONSE RECEIVER
SECOND MESSAGE TRANSMITTER
FIRST MESSAGE TRANSMITTER
OTHER SERVICE UTILIZATION REQUEST TRANSMITTER
SERVICE UTILIZING TERMINAL
33
31
35
AUTHENTICATION INFORMATION
AUTHENTICATION REQUESTING TERMINAL

Fig.2

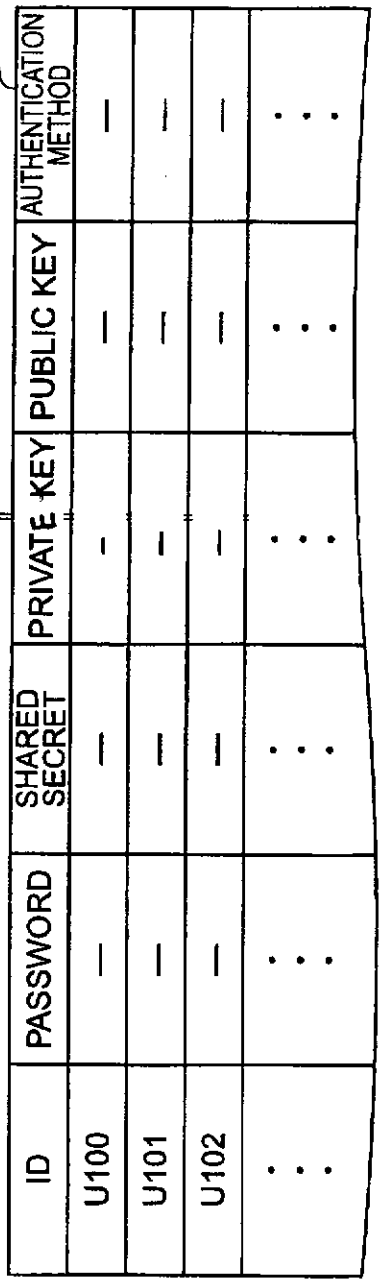

11
ID
PASSWORD
SHARED SECRET
PRIVATE KEY
PUBLIC KEY
AUTHENTICATION METHOD
U100
U101
U102

*Fig.3*

12

| ID | SERVICE B |
|---|---|
| U100 | ○ |
| U101 | × |
| U102 | ○ |
| ⋮ | ⋮ |

*Fig.4*

13

| PERMISSION ID | STATUS |
|---|---|
| A100 | ○ |
| A101 | × |
| A102 | ○ |
| ⋮ | ⋮ |

**Fig.5**

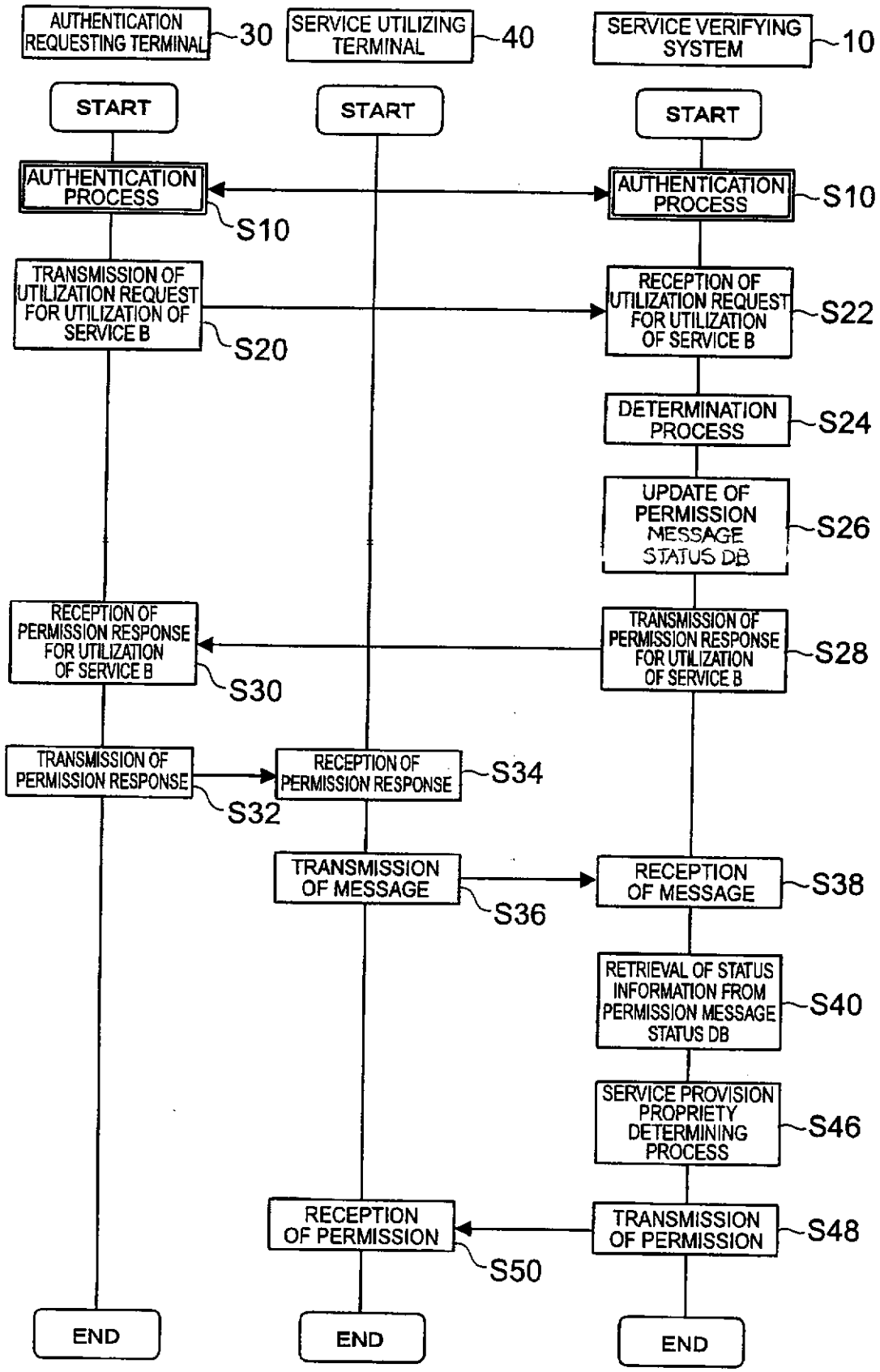

AUTHENTICATION REQUESTING TERMINAL
30
SERVICE UTILIZING TERMINAL
40
SERVICE VERIFYING SYSTEM
10
START
START
START
AUTHENTICATION PROCESS
S10
AUTHENTICATION PROCESS
S10
TRANSMISSION OF UTILIZATION REQUEST FOR UTILIZATION OF SERVICE B
S20
RECEPTION OF UTILIZATION REQUEST FOR UTILIZATION OF SERVICE B
S22
DETERMINATION PROCESS
S24
UPDATE OF PERMISSION MESSAGE STATUS DB
S26
RECEPTION OF PERMISSION RESPONSE FOR UTILIZATION OF SERVICE B
S30
TRANSMISSION OF PERMISSION RESPONSE FOR UTILIZATION OF SERVICE B
S28
TRANSMISSION OF PERMISSION RESPONSE
S32
RECEPTION OF PERMISSION RESPONSE
S34
TRANSMISSION OF MESSAGE
S36
RECEPTION OF MESSAGE
S38
RETRIEVAL OF STATUS INFORMATION FROM PERMISSION MESSAGE STATUS DB
S40
SERVICE PROVISION PROPRIETY DETERMINING PROCESS
S46
RECEPTION OF PERMISSION
S50
TRANSMISSION OF PERMISSION
S48
END
END
END

*Fig.6*

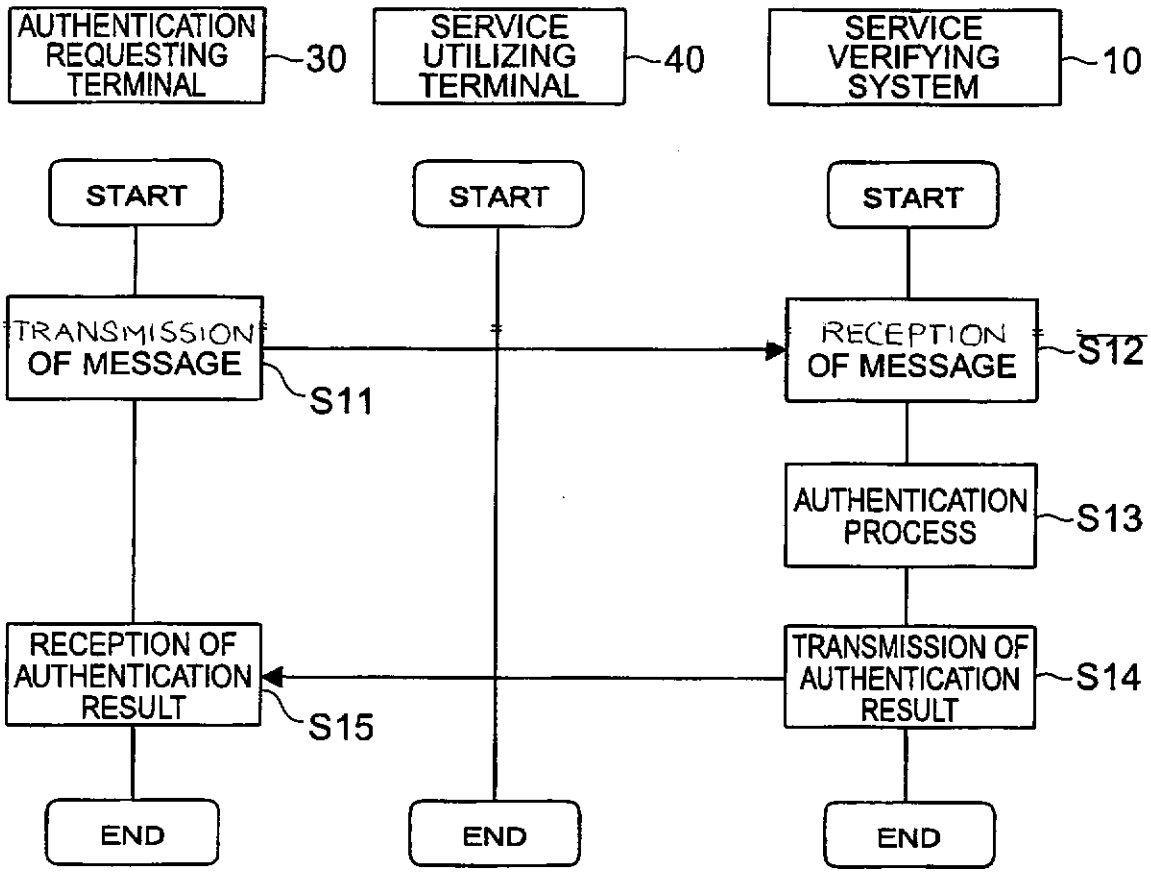

AUTHENTICATION REQUESTING TERMINAL
30
SERVICE UTILIZING TERMINAL
40
SERVICE VERIFYING SYSTEM
10
START
START
START
TRANSMISSION OF MESSAGE
S11
RECEPTION OF MESSAGE
S12
AUTHENTICATION PROCESS
S13
RECEPTION OF AUTHENTICATION RESULT
S15
TRANSMISSION OF AUTHENTICATION RESULT
S14
END
END
END

*Fig.7*

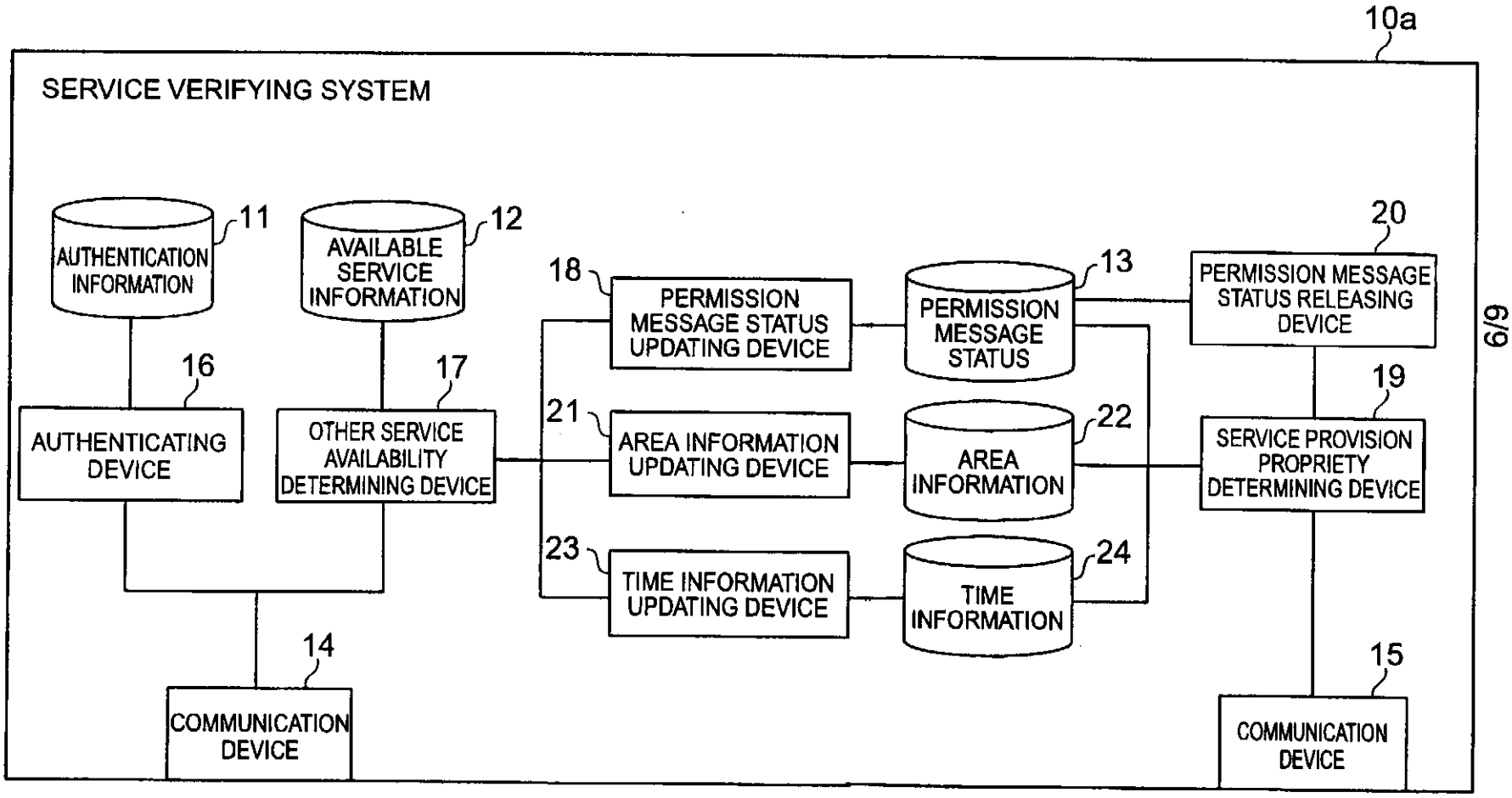

10a
SERVICE VERIFYING SYSTEM
AUTHENTICATION INFORMATION
11
AVAILABLE SERVICE INFORMATION
12
18
PERMISSION MESSAGE STATUS UPDATING DEVICE
PERMISSION MESSAGE STATUS
13
20
PERMISSION MESSAGE STATUS RELEASING DEVICE
16
17
19
AUTHENTICATING DEVICE
OTHER SERVICE AVAILABILITY DETERMINING DEVICE
21
AREA INFORMATION UPDATING DEVICE
AREA INFORMATION
22
SERVICE PROVISION PROPRIETY DETERMINING DEVICE
23
TIME INFORMATION UPDATING DEVICE
TIME INFORMATION
24
14
15
COMMUNICATION DEVICE
COMMUNICATION DEVICE

*Fig.8*

22

| PERMISSION ID | AVAILABLE AREA |
|---|---|
| A100 | AREA A |
| A101 | AREA B |
| A102 | AREA C |
| ⋮ | ⋮ |

*Fig.9*

24

| PERMISSION ID | AVAILABLE AREA |
|---|---|
| A100 | 10:00～10:05 |
| A101 | 10:02～10:07 |
| A102 | 10:05～10:10 |
| ⋮ | ⋮ |

**Fig.10**

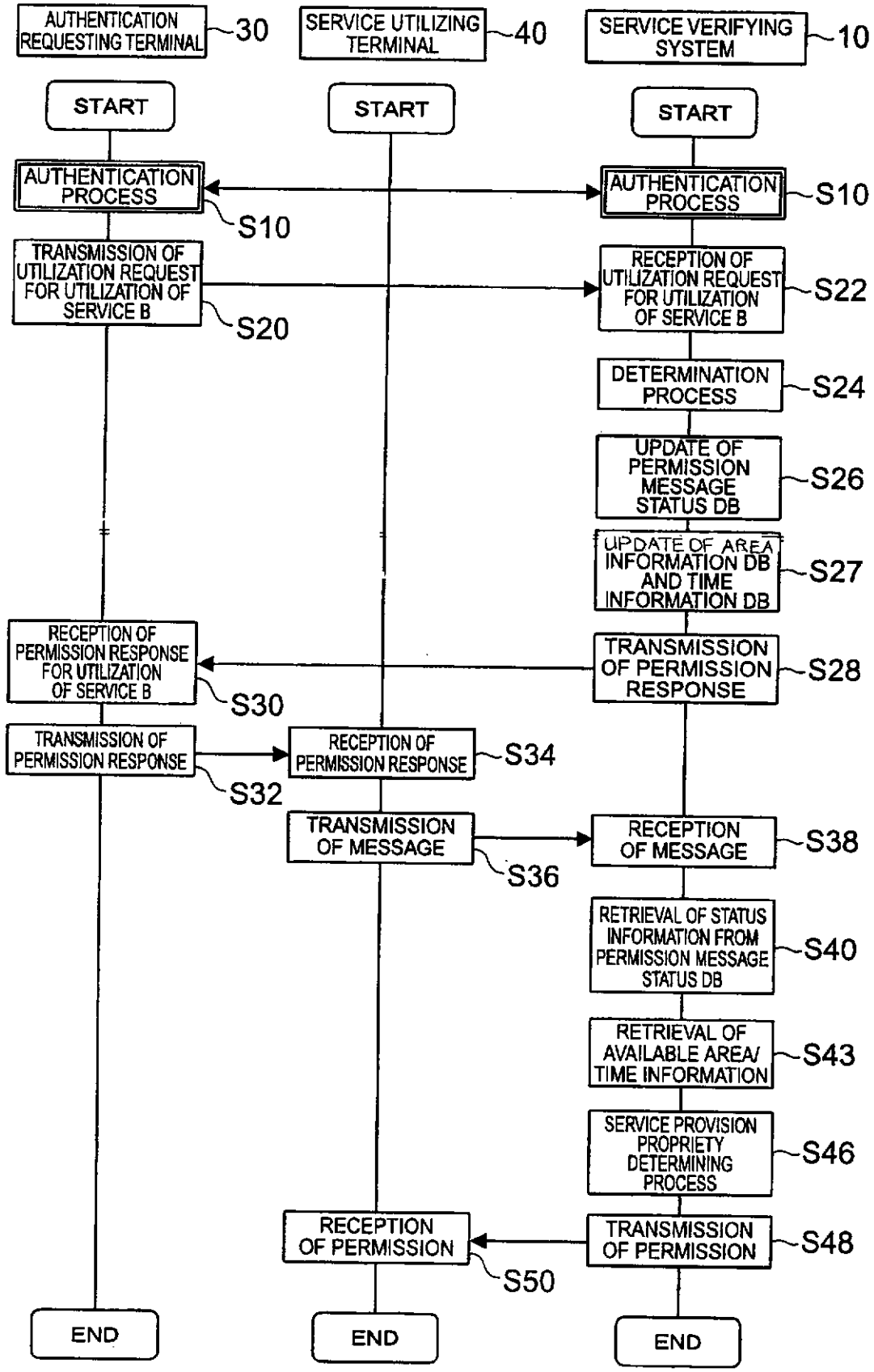
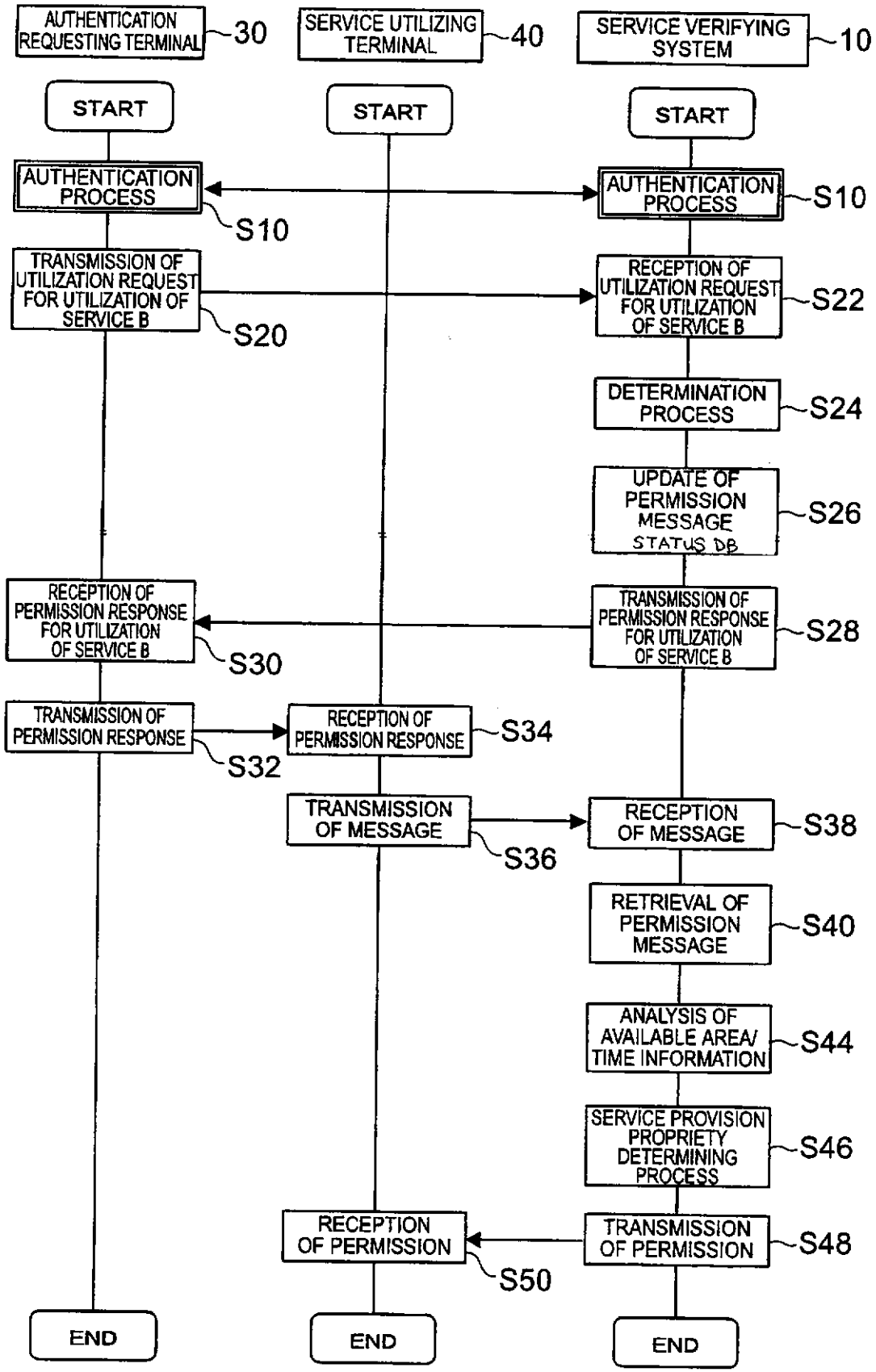

AUTHENTICATION REQUESTING TERMINAL
30
SERVICE UTILIZING TERMINAL
40
SERVICE VERIFYING SYSTEM
10
START
START
START
AUTHENTICATION PROCESS
S10
AUTHENTICATION PROCESS
S10
TRANSMISSION OF UTILIZATION REQUEST FOR UTILIZATION OF SERVICE B
S20
RECEPTION OF UTILIZATION REQUEST FOR UTILIZATION OF SERVICE B
S22
DETERMINATION PROCESS
S24
UPDATE OF PERMISSION MESSAGE STATUS DB
S26
UPDATE OF AREA INFORMATION DB AND TIME INFORMATION DB
S27
RECEPTION OF PERMISSION RESPONSE FOR UTILIZATION OF SERVICE B
S30
TRANSMISSION OF PERMISSION RESPONSE
S28
TRANSMISSION OF PERMISSION RESPONSE
S32
RECEPTION OF PERMISSION RESPONSE
S34
TRANSMISSION OF MESSAGE
S36
RECEPTION OF MESSAGE
S38
RETRIEVAL OF STATUS INFORMATION FROM PERMISSION MESSAGE STATUS DB
S40
RETRIEVAL OF AVAILABLE AREA/ TIME INFORMATION
S43
SERVICE PROVISION PROPRIETY DETERMINING PROCESS
S46
RECEPTION OF PERMISSION
S50
TRANSMISSION OF PERMISSION
S48
END
END
END

**Fig.11**


AUTHENTICATION REQUESTING TERMINAL
30
SERVICE UTILIZING TERMINAL
40
SERVICE VERIFYING SYSTEM
10
START
START
START
AUTHENTICATION PROCESS
S10
AUTHENTICATION PROCESS
S10
TRANSMISSION OF UTILIZATION REQUEST FOR UTILIZATION OF SERVICE B
S20
RECEPTION OF UTILIZATION REQUEST FOR UTILIZATION OF SERVICE B
S22
DETERMINATION PROCESS
S24
UPDATE OF PERMISSION MESSAGE STATUS DB
S26
RECEPTION OF PERMISSION RESPONSE FOR UTILIZATION OF SERVICE B
S30
TRANSMISSION OF PERMISSION RESPONSE FOR UTILIZATION OF SERVICE B
S28
TRANSMISSION OF PERMISSION RESPONSE
S32
RECEPTION OF PERMISSION RESPONSE
S34
TRANSMISSION OF MESSAGE
S36
RECEPTION OF MESSAGE
S38
RETRIEVAL OF PERMISSION MESSAGE
S40
ANALYSIS OF AVAILABLE AREA/ TIME INFORMATION
S44
SERVICE PROVISION PROPRIETY DETERMINING PROCESS
S46
RECEPTION OF PERMISSION
S50
TRANSMISSION OF PERMISSION
S48
END
END
END