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Ueno et al.

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(45) **Date of Patent: Apr. 15, 2014**

(54) **CONTENTS SERVER AND CONTENTS SERVER SYSTEM**

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(73) Assignee: **Fujitsu Limited**, Kawasaki (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 800 days.

(21) Appl. No.: **11/801,064**

(22) Filed: **May 8, 2007**

(65) **Prior Publication Data**

US 2007/0214217 A1 Sep. 13, 2007

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2005/005938, filed on Mar. 29, 2005.

(30) **Foreign Application Priority Data**

Nov. 10, 2004 (WO) PCT/JP2004/016670

(51) **Int. Cl.**
G06F 15/16 (2006.01)

(52) **U.S. Cl.**
USPC **709/204**; 709/206; 709/224; 709/226; 709/231

(58) **Field of Classification Search**
USPC 709/204, 207; 713/152; 379/202.1; 455/416, 417
See application file for complete search history.

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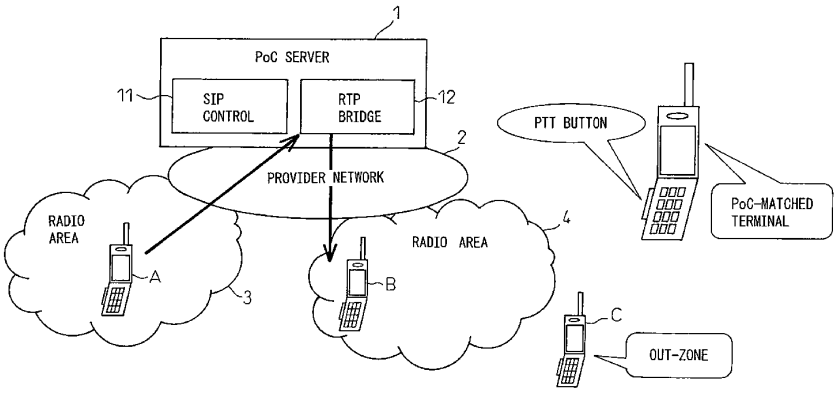
(Continued)

Primary Examiner — Randy Scott
(74) *Attorney, Agent, or Firm* — Katten Muchin Rosenman LLP

(57) **ABSTRACT**

The present invention relates to a communication system, and the invention specifically provides a contents server that appropriately stores media contents from group users in a PoC Service and a conference service. The contents server includes: a recording unit that records media information from plural users in a communicatable state participating in a predetermined group, for each group; a detecting unit that detects a communicatable state or an uncommunicatable state of each participating user, at each predetermined time; and a deleting unit that deletes confirmed media information already recorded in the recording unit, upon detecting that all the participating users are in the communicatable state.

8 Claims, 47 Drawing Sheets



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Supplementary European Search Report dated Dec. 20, 2010, from the corresponding European Application.

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Fig.1

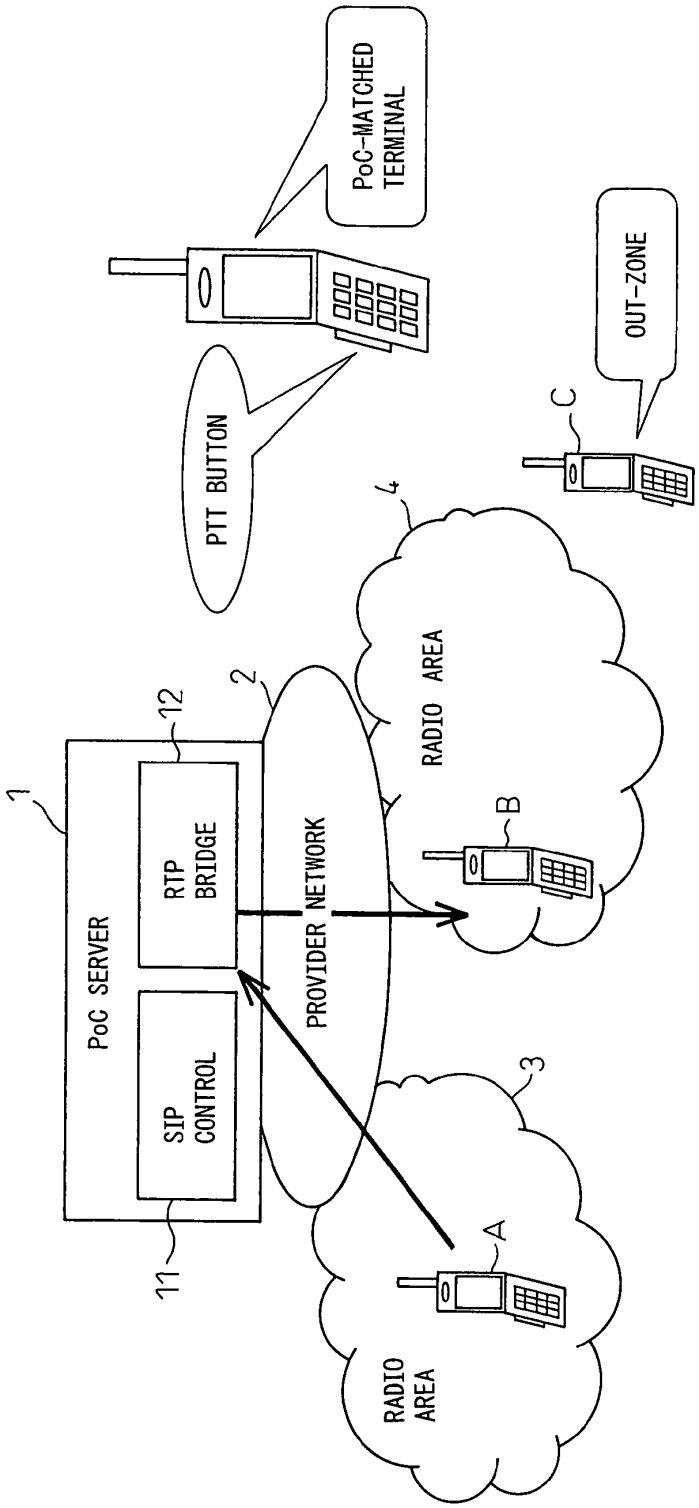

PoC-MATCHED TERMINAL
PTT BUTTON
OUT-ZONE
C
4
RADIO AREA
B
2
12
1
RTP BRIDGE
PROVIDER NETWORK
PoC SERVER
SIP CONTROL
3
A
11
RADIO AREA

Fig. 2

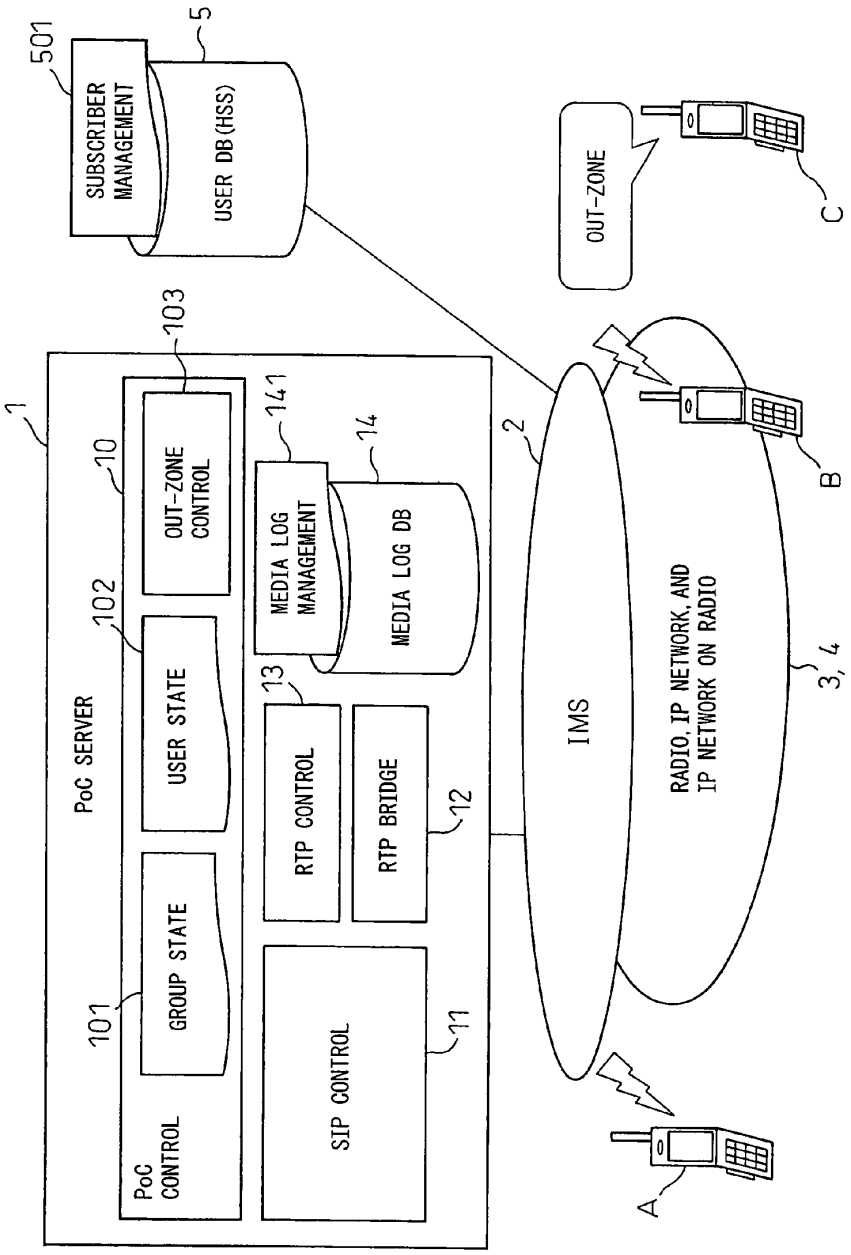

501
SUBSCRIBER MANAGEMENT
5
USER DB (HSS)
1
PoC SERVER
103
10
OUT-ZONE CONTROL
102
USER STATE
101
GROUP STATE
PoC CONTROL
141
MEDIA LOG MANAGEMENT
14
MEDIA LOG DB
13
RTP CONTROL
RTP BRIDGE
12
SIP CONTROL
11
2
IMS
RADIO, IP NETWORK, AND IP NETWORK ON RADIO
3, 4
OUT-ZONE
C
B
A

Fig.3A

SUBSCRIBER MANAGEMENT TABLE

501

USER	PoC SERVICE	PoC ACCUMULATION	GROUP
A	SUBSCRIPTION	SUBSCRIPTION	I, II
B	SUBSCRIPTION	SUBSCRIPTION	I
C	SUBSCRIPTION	SUBSCRIPTION	I
D	SUBSCRIPTION	NONSUBSCRIPTION	III, V
E	NONSUBSCRIPTION	NONSUBSCRIPTION	—

Fig.3B

GROUP STATE TABLE

101

GROUP	STATE
I	GROUP ACTIVE
II	INITIAL STATE
III	INITIAL STATE

Fig.3C

USER STATE TABLE

102

USER	STATE	FINAL CONFIRMATION TIME
A	INITIAL	—
B	IN-ZONE	10 : 05
C	OUT-ZONE	9 : 55

Fig.3D

MEDIA LOG MANAGEMENT TABLE

141

GROUP	TRANSMISSION SOURCE	TIME	DATA FILE
I	A	9 : 45	ABANDON
I	A	9 : 50	ABANDON
I	B	9 : 55	ABANDON
I	A	10 : 00	DATA 1
I	B	10 : 05	DATA 2

Fig. 4

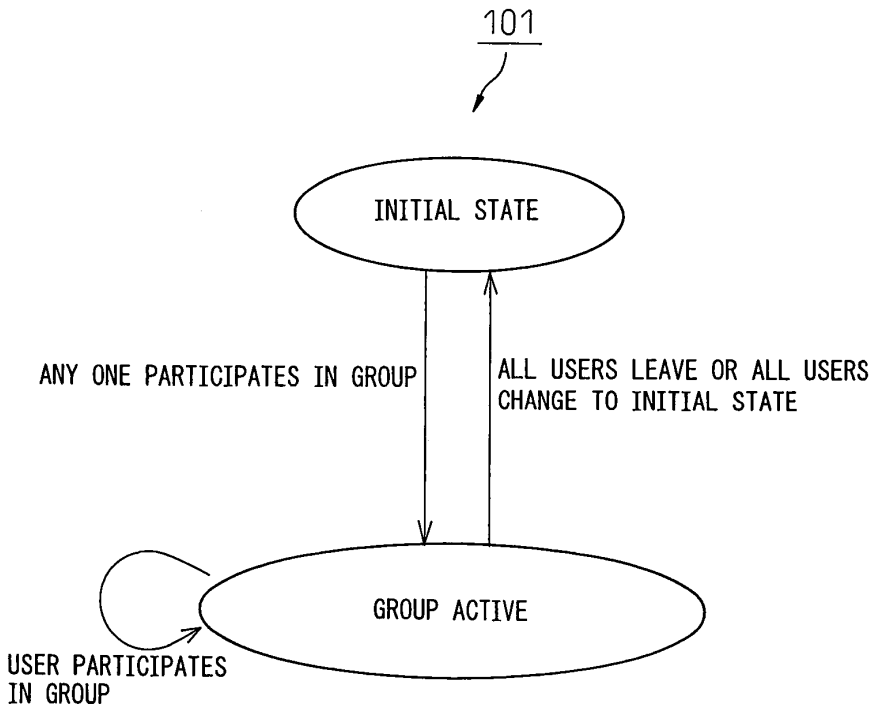

101
INITIAL STATE
ANY ONE PARTICIPATES IN GROUP
ALL USERS LEAVE OR ALL USERS CHANGE TO INITIAL STATE
GROUP ACTIVE
USER PARTICIPATES IN GROUP

Fig.5

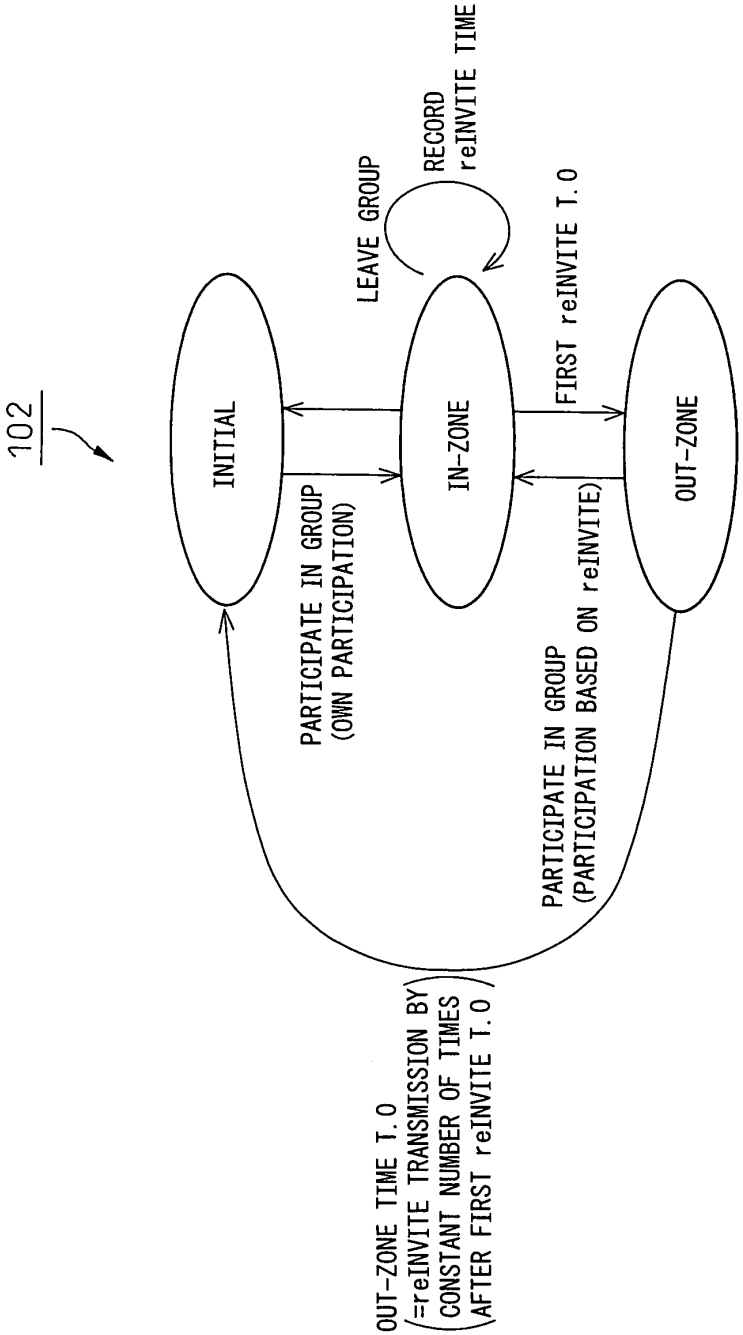

102
INITIAL
IN-ZONE
OUT-ZONE
LEAVE GROUP
RECORD
reINVITE TIME
FIRST reINVITE T.O
PARTICIPATE IN GROUP
(OWN PARTICIPATION)
PARTICIPATE IN GROUP
(PARTICIPATION BASED ON reINVITE)
OUT-ZONE TIME T.O
(=reINVITE TRANSMISSION BY
CONSTANT NUMBER OF TIMES
AFTER FIRST reINVITE T.O)

Fig.6

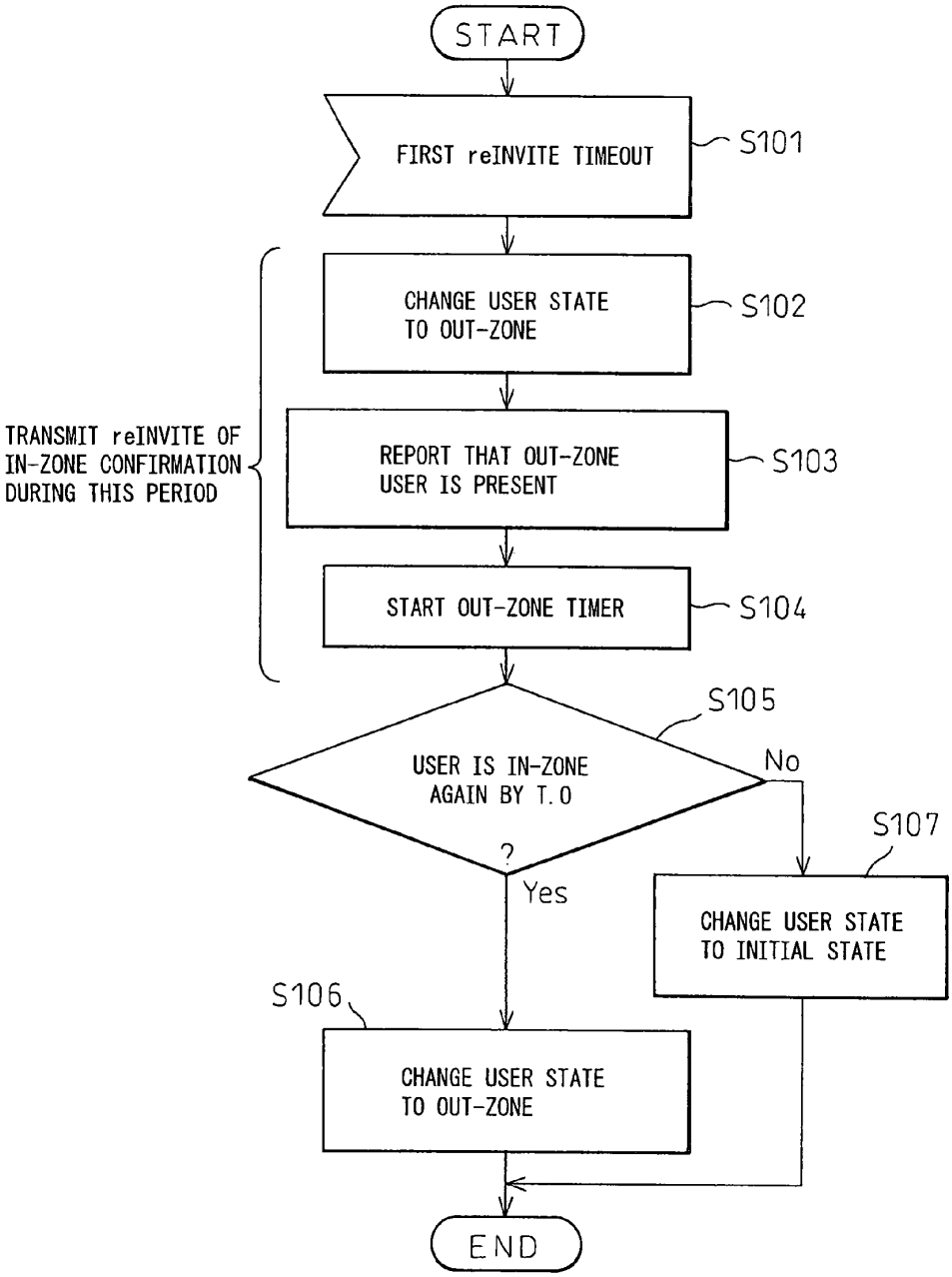

START
FIRST reINVITE TIMEOUT
S101
CHANGE USER STATE TO OUT-ZONE
S102
TRANSMIT reINVITE OF IN-ZONE CONFIRMATION DURING THIS PERIOD
REPORT THAT OUT-ZONE USER IS PRESENT
S103
START OUT-ZONE TIMER
S104
S105
USER IS IN-ZONE AGAIN BY T.O ?
No
Yes
S107
CHANGE USER STATE TO INITIAL STATE
S106
CHANGE USER STATE TO OUT-ZONE
END

Fig.7A

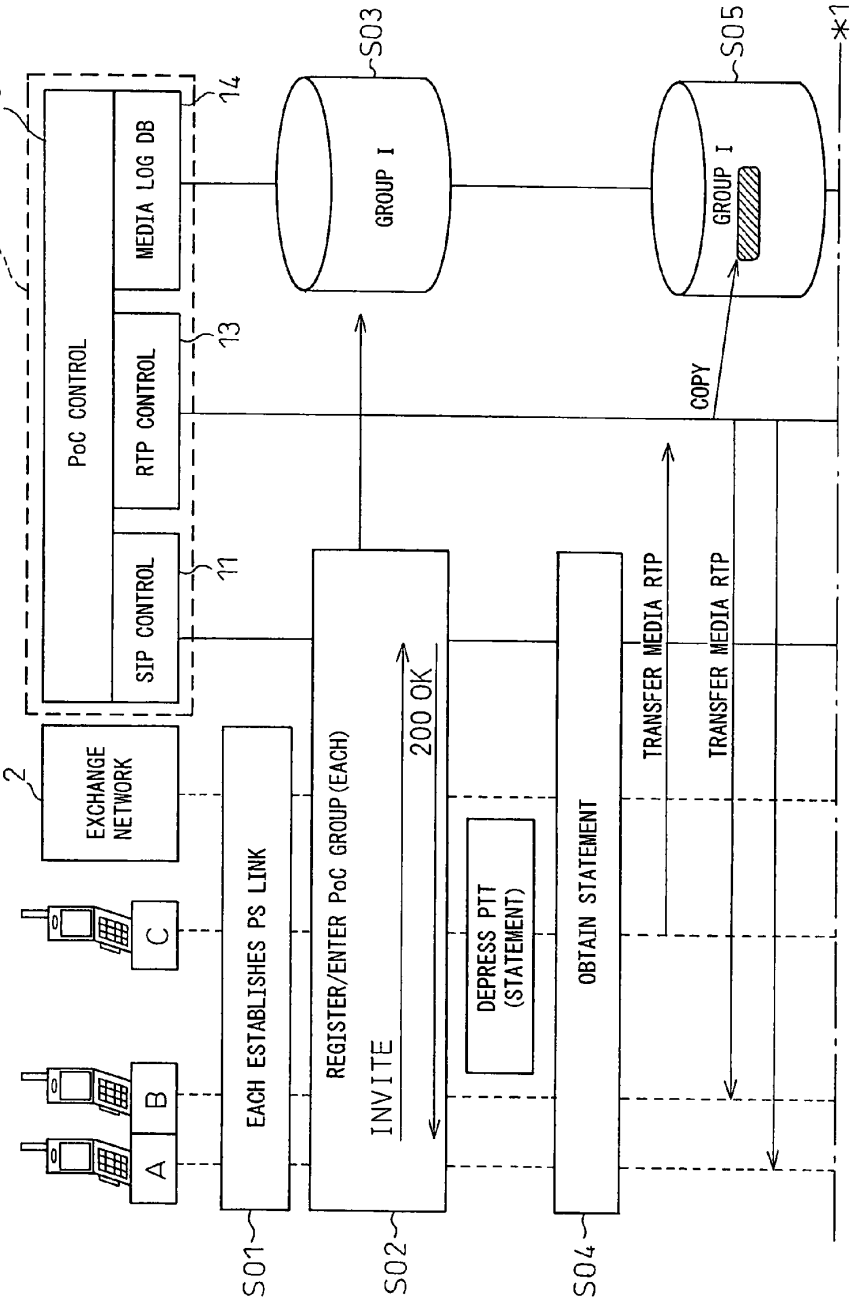

10
1
PoC CONTROL
SIP CONTROL
RTP CONTROL
MEDIA LOG DB
11
13
14
2
EXCHANGE NETWORK
A
B
C
S01
EACH ESTABLISHES PS LINK
S02
REGISTER/ENTER PoC GROUP (EACH)
INVITE
200 OK
S03
GROUP I
DEPRESS PTT (STATEMENT)
S04
OBTAIN STATEMENT
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
S05
GROUP I
COPY
*1

Fig.7B

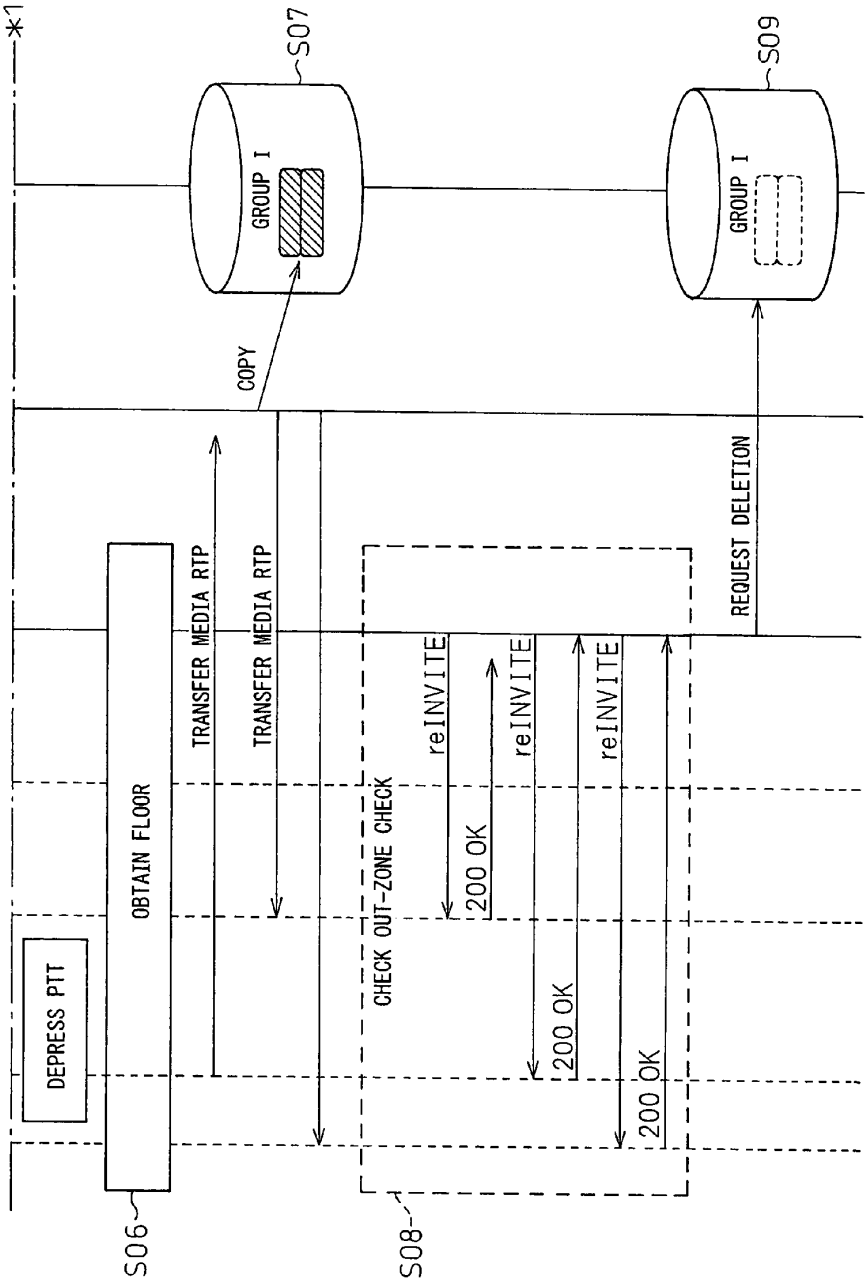

*1
S07
S09
GROUP I
GROUP I
COPY
REQUEST DELETION
DEPRESS PTT
OBTAIN FLOOR
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
CHECK OUT-ZONE CHECK
reINVITE
200 OK
reINVITE
200 OK
reINVITE
200 OK
S06
S08

Fig. 8

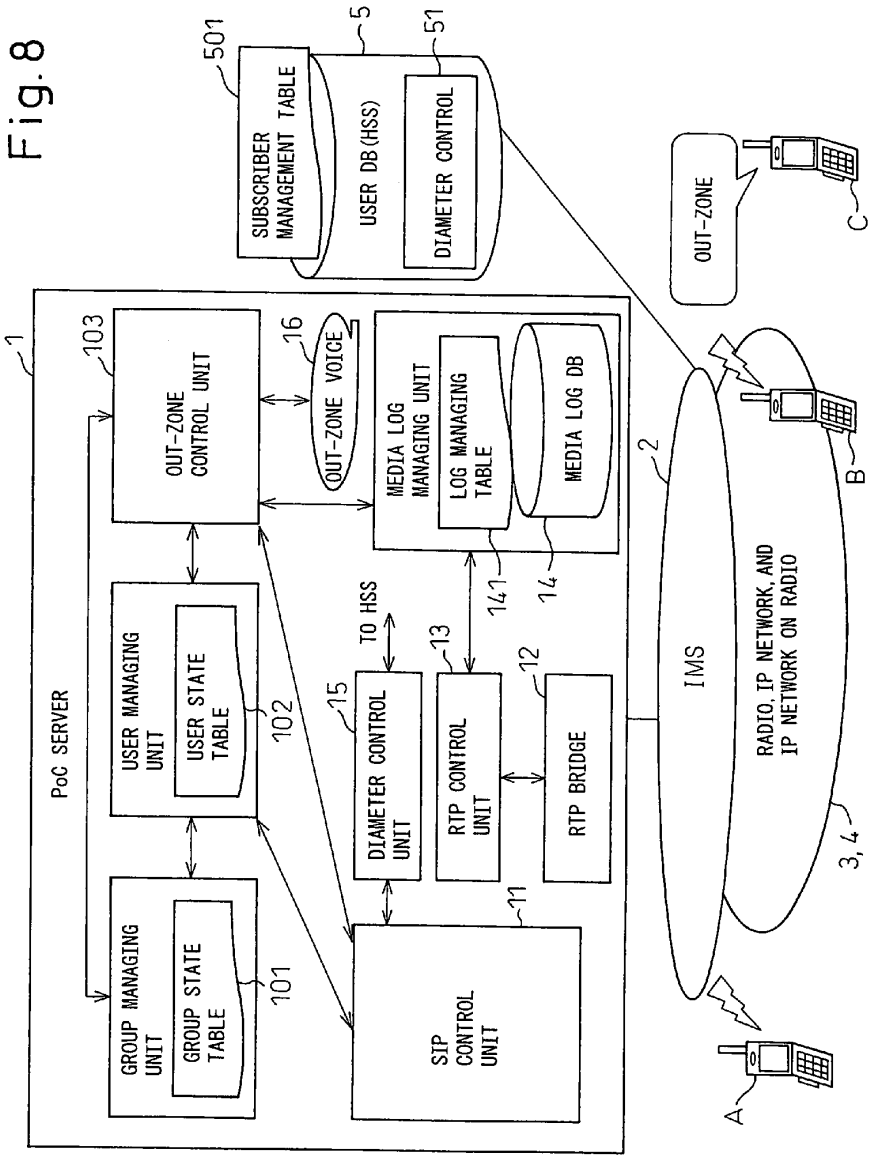

1
PoC SERVER
103
OUT-ZONE CONTROL UNIT
16
OUT-ZONE VOICE
USER MANAGING UNIT
USER STATE TABLE
102
GROUP MANAGING UNIT
GROUP STATE TABLE
101
TO HSS
15
DIAMETER CONTROL UNIT
13
RTP CONTROL UNIT
12
RTP BRIDGE
11
SIP CONTROL UNIT
MEDIA LOG MANAGING UNIT
LOG MANAGING TABLE
141
MEDIA LOG DB
14
501
SUBSCRIBER MANAGEMENT TABLE
5
USER DB (HSS)
51
DIAMETER CONTROL
2
IMS
RADIO, IP NETWORK, AND IP NETWORK ON RADIO
3, 4
OUT-ZONE
A
B
C

Fig.9

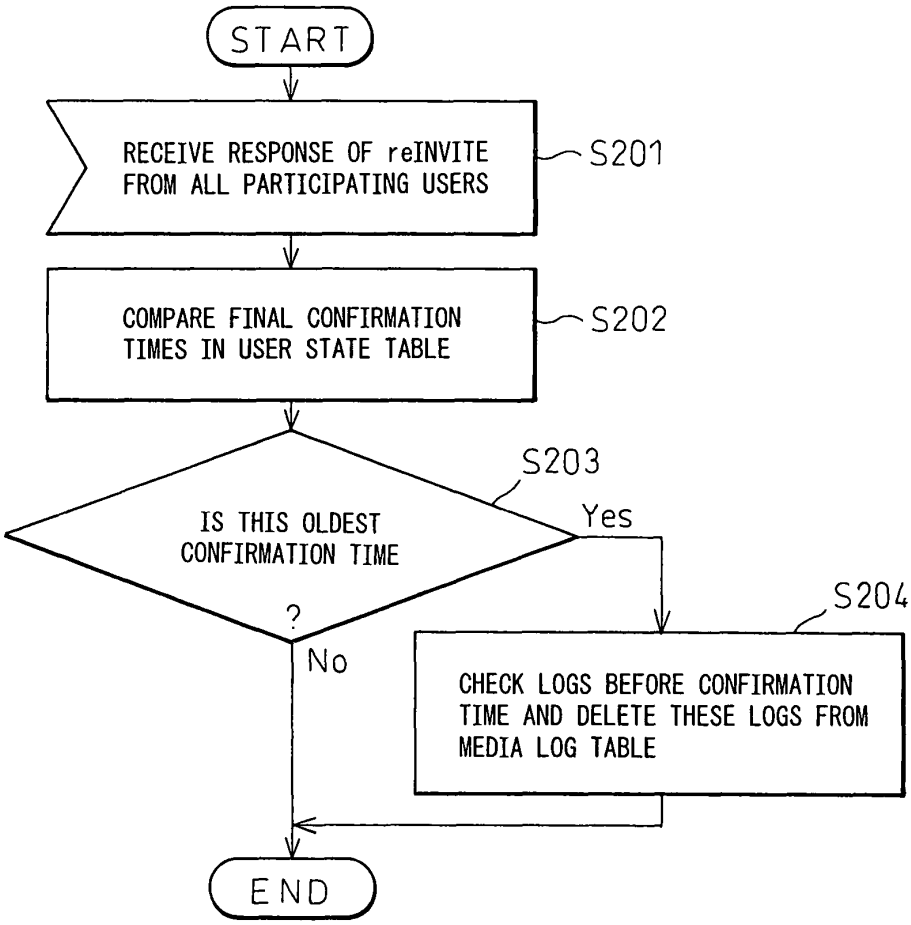
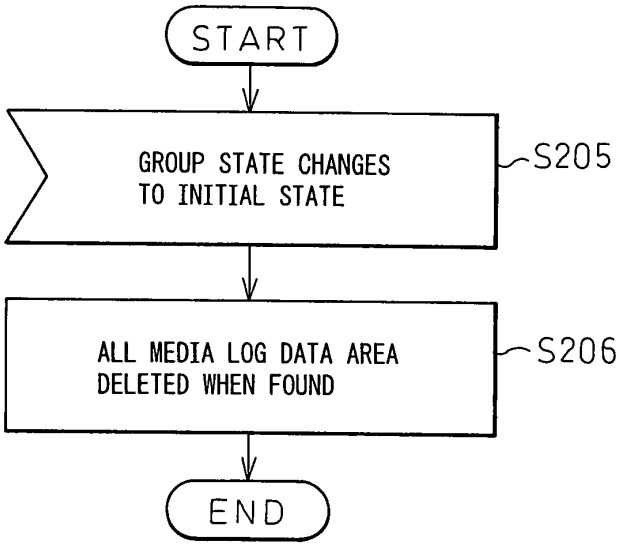

START
RECEIVE RESPONSE OF reINVITE FROM ALL PARTICIPATING USERS
S201
COMPARE FINAL CONFIRMATION TIMES IN USER STATE TABLE
S202
S203
IS THIS OLDEST CONFIRMATION TIME ?
Yes
No
S204
CHECK LOGS BEFORE CONFIRMATION TIME AND DELETE THESE LOGS FROM MEDIA LOG TABLE
END

Fig.10


START
GROUP STATE CHANGES TO INITIAL STATE
S205
ALL MEDIA LOG DATA AREA DELETED WHEN FOUND
S206
END

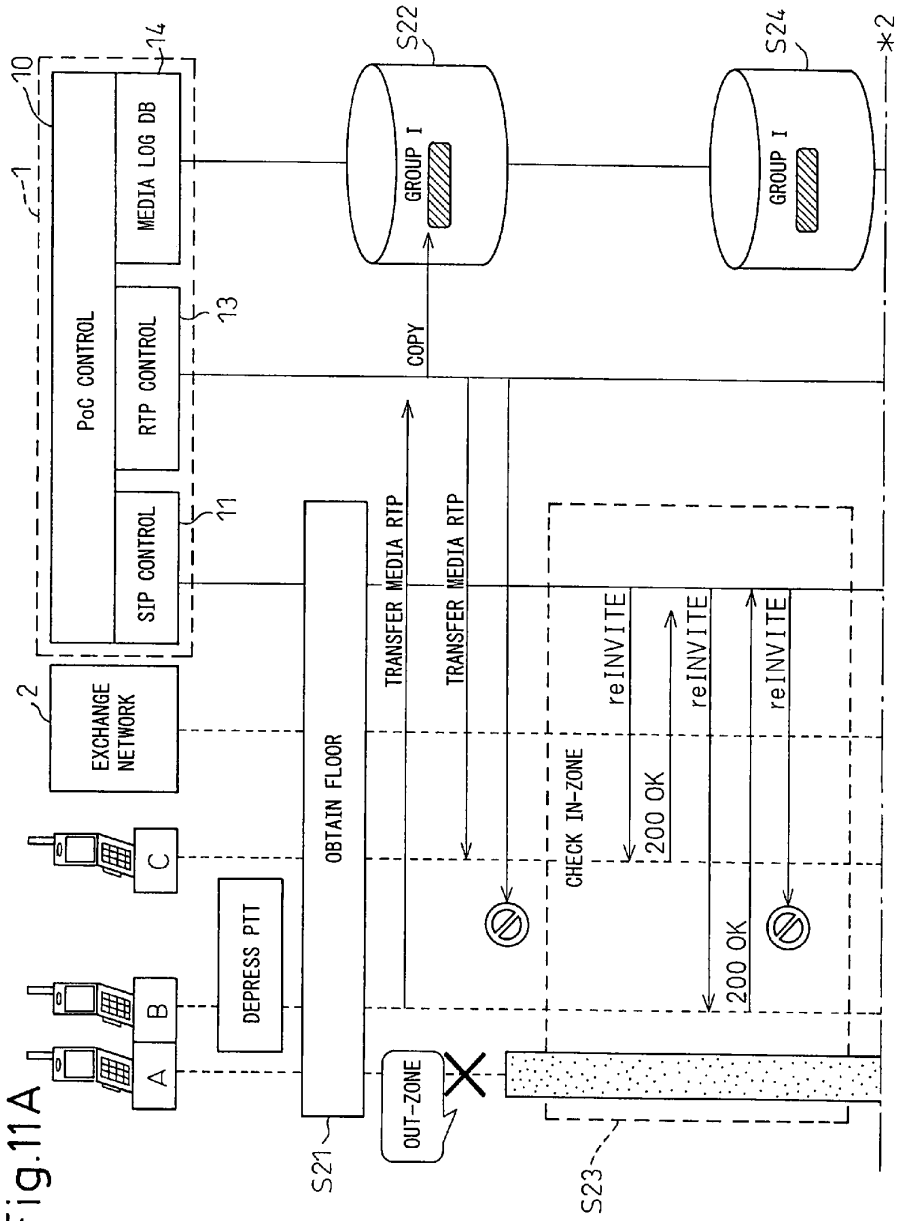

10
1
14
PoC CONTROL
MEDIA LOG DB
RTP CONTROL
13
SIP CONTROL
11
2
EXCHANGE NETWORK
A
B
C
DEPRESS PTT
OBTAIN FLOOR
S21
OUT-ZONE
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
COPY
S22
GROUP I
S24
GROUP I
*2
CHECK IN-ZONE
reINVITE
200 OK
reINVITE
200 OK
reINVITE
S23

Fig.11A

Fig.11B

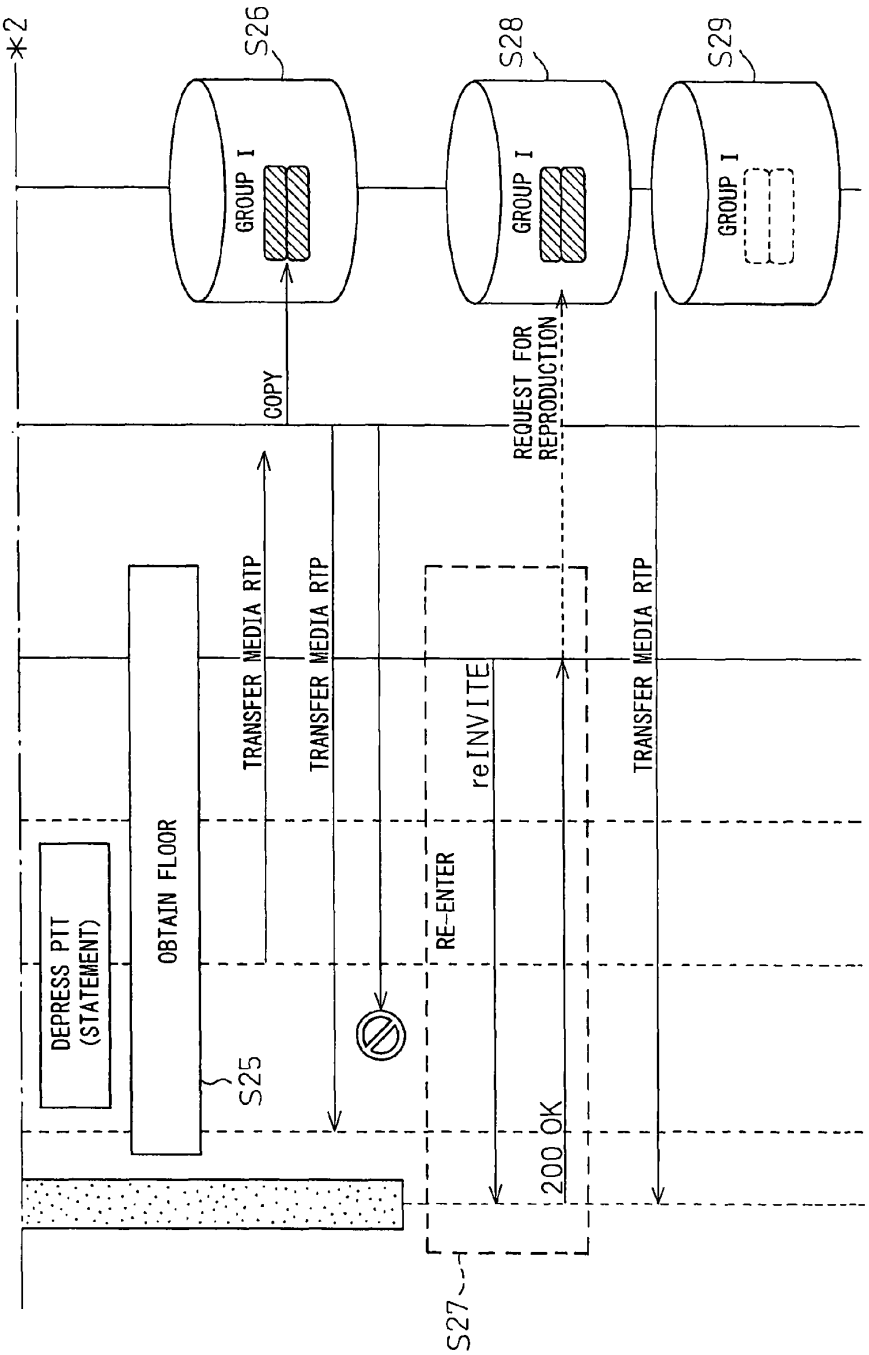

*2
S26
S28
S29
GROUP I
GROUP I
GROUP I
COPY
REQUEST FOR REPRODUCTION
DEPRESS PTT (STATEMENT)
OBTAIN FLOOR
S25
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
RE-ENTER
reINVITE
200 OK
S27

Fig.12

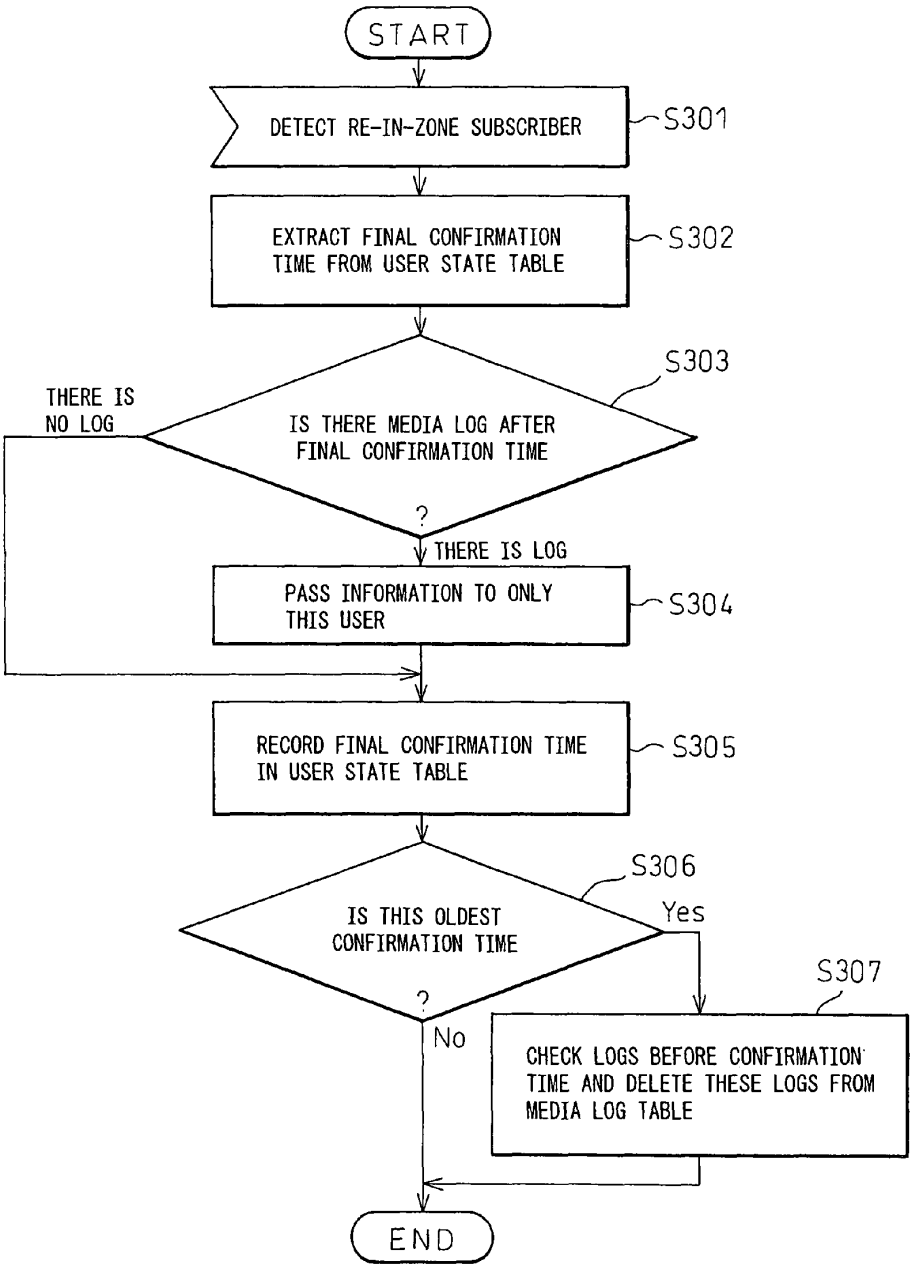

START
DETECT RE-IN-ZONE SUBSCRIBER
S301
EXTRACT FINAL CONFIRMATION TIME FROM USER STATE TABLE
S302
S303
THERE IS NO LOG
IS THERE MEDIA LOG AFTER FINAL CONFIRMATION TIME ?
THERE IS LOG
PASS INFORMATION TO ONLY THIS USER
S304
RECORD FINAL CONFIRMATION TIME IN USER STATE TABLE
S305
S306
IS THIS OLDEST CONFIRMATION TIME ?
Yes
No
S307
CHECK LOGS BEFORE CONFIRMATION TIME AND DELETE THESE LOGS FROM MEDIA LOG TABLE
END

Fig.13

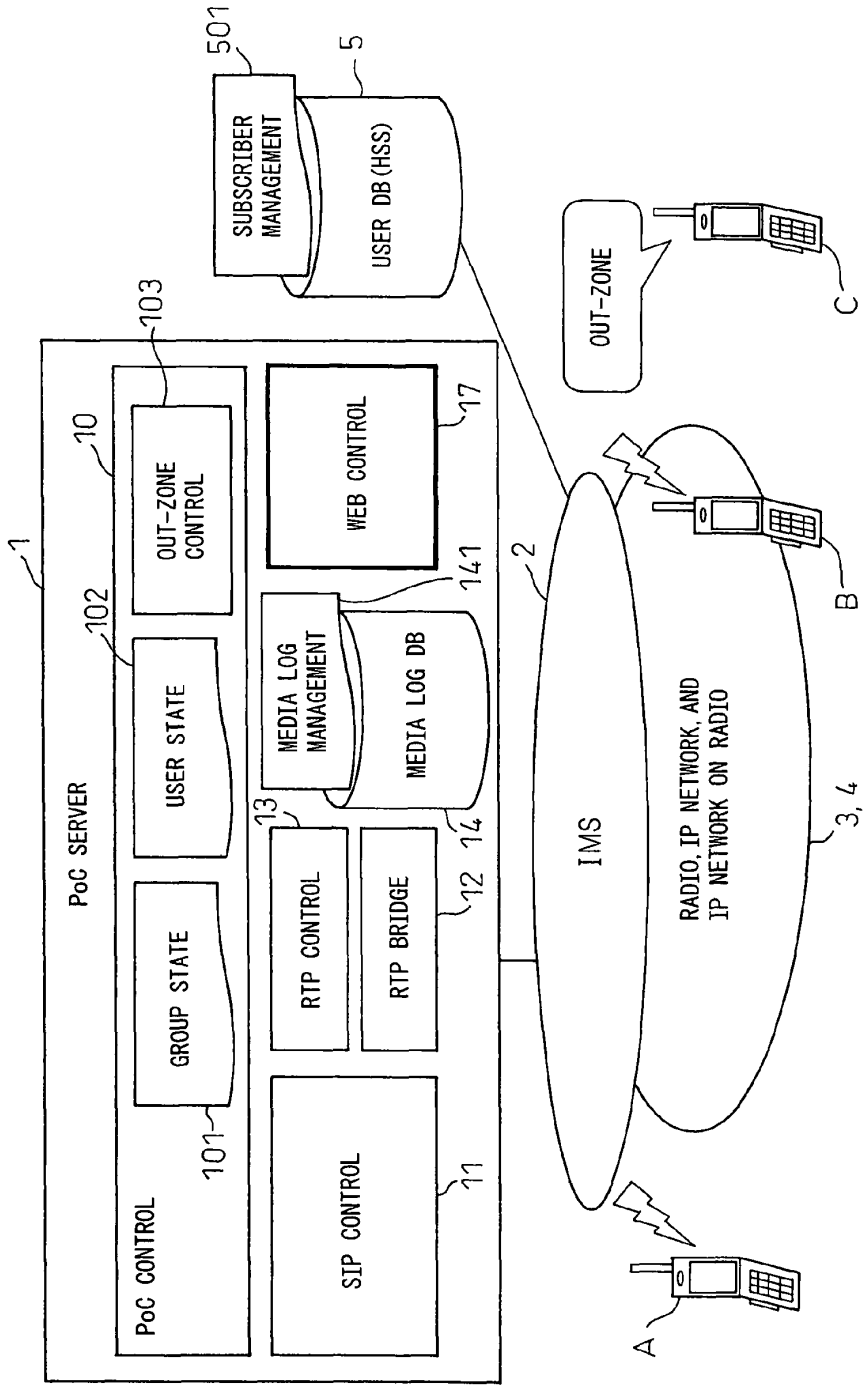

501
SUBSCRIBER MANAGEMENT
5
USER DB (HSS)
103
10
OUT-ZONE CONTROL
1
PoC SERVER
102
USER STATE
101
GROUP STATE
PoC CONTROL
WEB CONTROL
17
141
MEDIA LOG MANAGEMENT
MEDIA LOG DB
14
13
RTP CONTROL
RTP BRIDGE
12
SIP CONTROL
11
2
IMS
RADIO, IP NETWORK, AND IP NETWORK ON RADIO
3, 4
OUT-ZONE
A
B
C

Fig.14

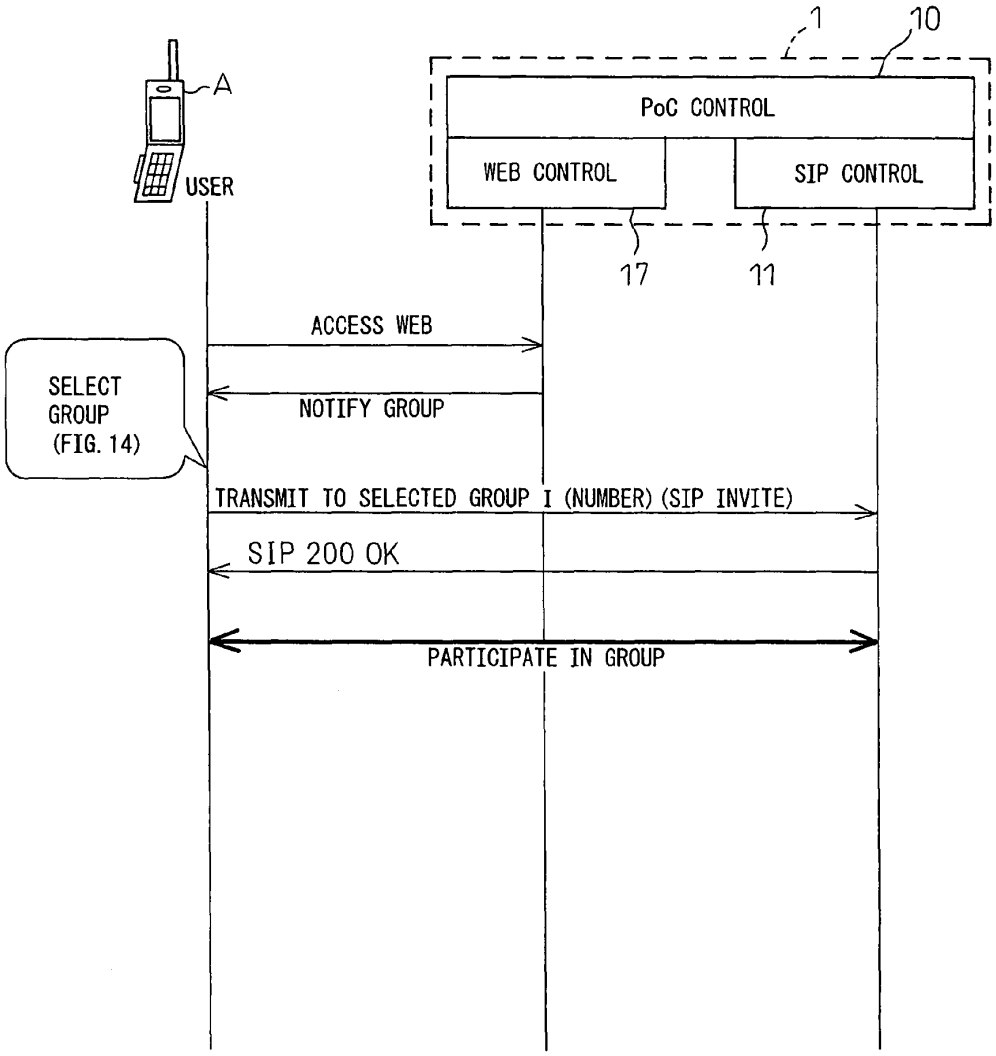
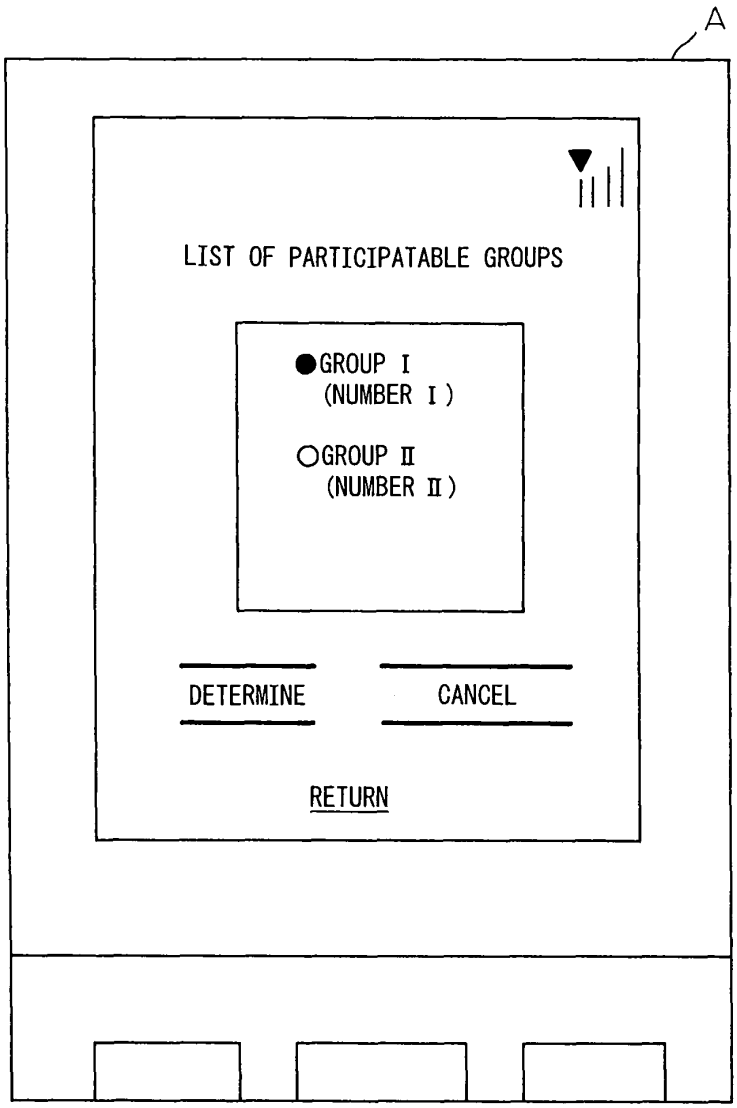

1
10
A
USER
PoC CONTROL
WEB CONTROL
SIP CONTROL
17
11
ACCESS WEB
NOTIFY GROUP
SELECT GROUP (FIG. 14)
TRANSMIT TO SELECTED GROUP I (NUMBER) (SIP INVITE)
SIP 200 OK
PARTICIPATE IN GROUP

Fig.15


A
LIST OF PARTICIPATABLE GROUPS
●GROUP I
(NUMBER I)
○GROUP II
(NUMBER II)
DETERMINE
CANCEL
RETURN

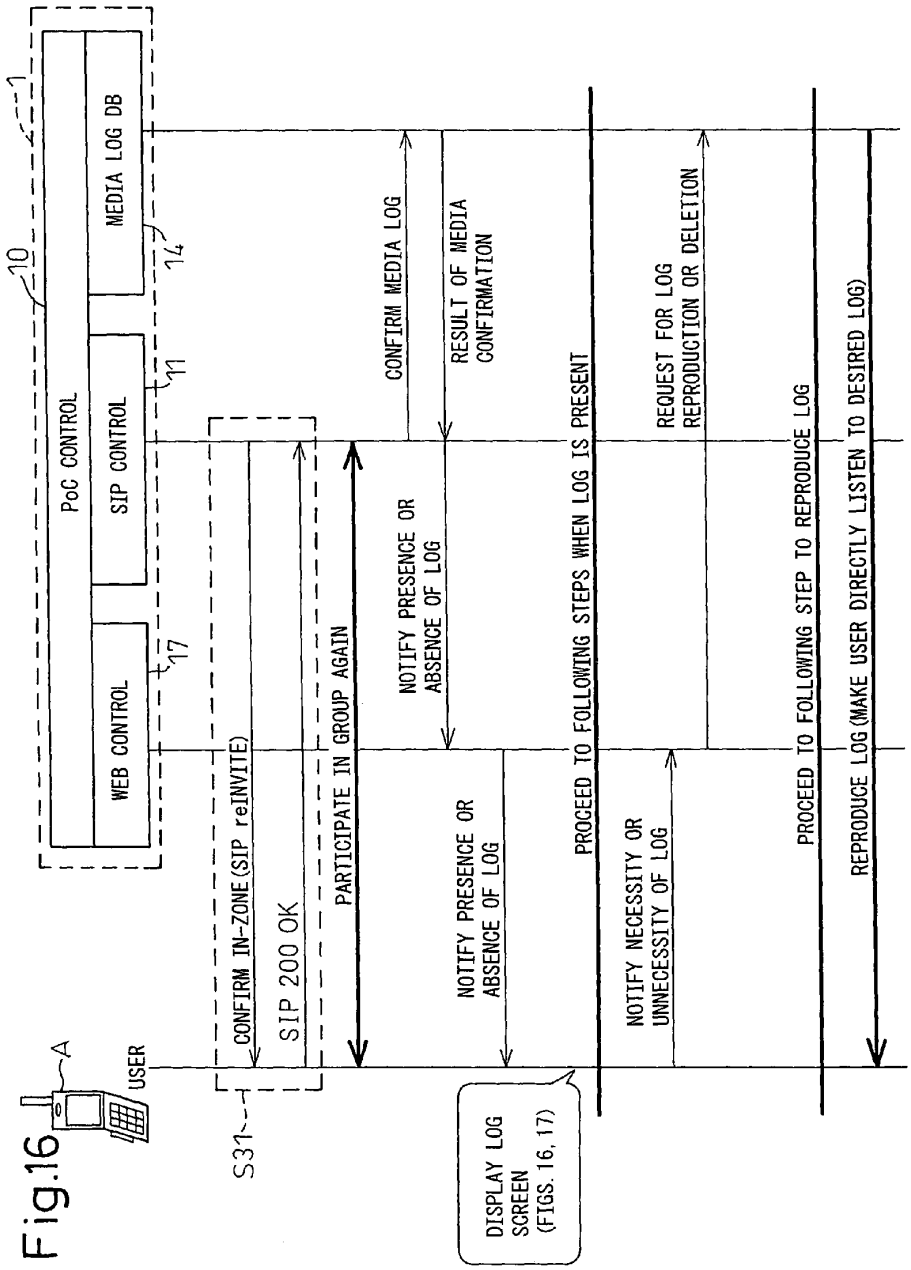

1
10
PoC CONTROL
WEB CONTROL
SIP CONTROL
MEDIA LOG DB
17
11
14
A
USER
S31
CONFIRM IN-ZONE(SIP reINVITE)
SIP 200 OK
PARTICIPATE IN GROUP AGAIN
NOTIFY PRESENCE OR ABSENCE OF LOG
NOTIFY PRESENCE OR ABSENCE OF LOG
CONFIRM MEDIA LOG
RESULT OF MEDIA CONFIRMATION
PROCEED TO FOLLOWING STEPS WHEN LOG IS PRESENT
NOTIFY NECESSITY OR UNNECESSITY OF LOG
REQUEST FOR LOG REPRODUCTION OR DELETION
PROCEED TO FOLLOWING STEP TO REPRODUCE LOG
REPRODUCE LOG(MAKE USER DIRECTLY LISTEN TO DESIRED LOG)
DISPLAY LOG SCREEN (FIGS. 16, 17)

Fig.16

Fig.17

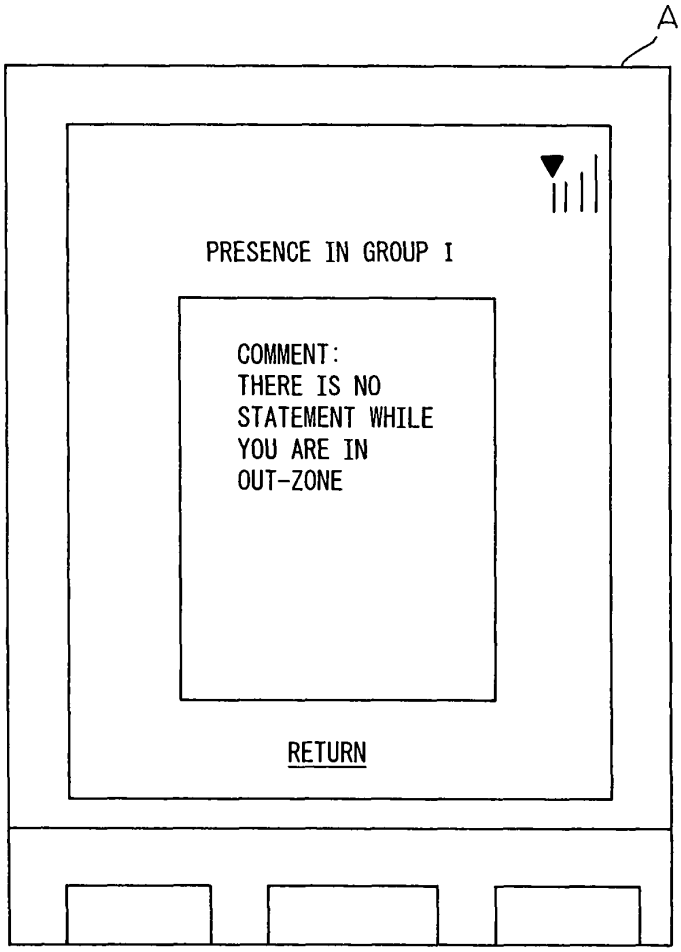

A
PRESENCE IN GROUP I
COMMENT:
THERE IS NO
STATEMENT WHILE
YOU ARE IN
OUT-ZONE
RETURN

Fig.18

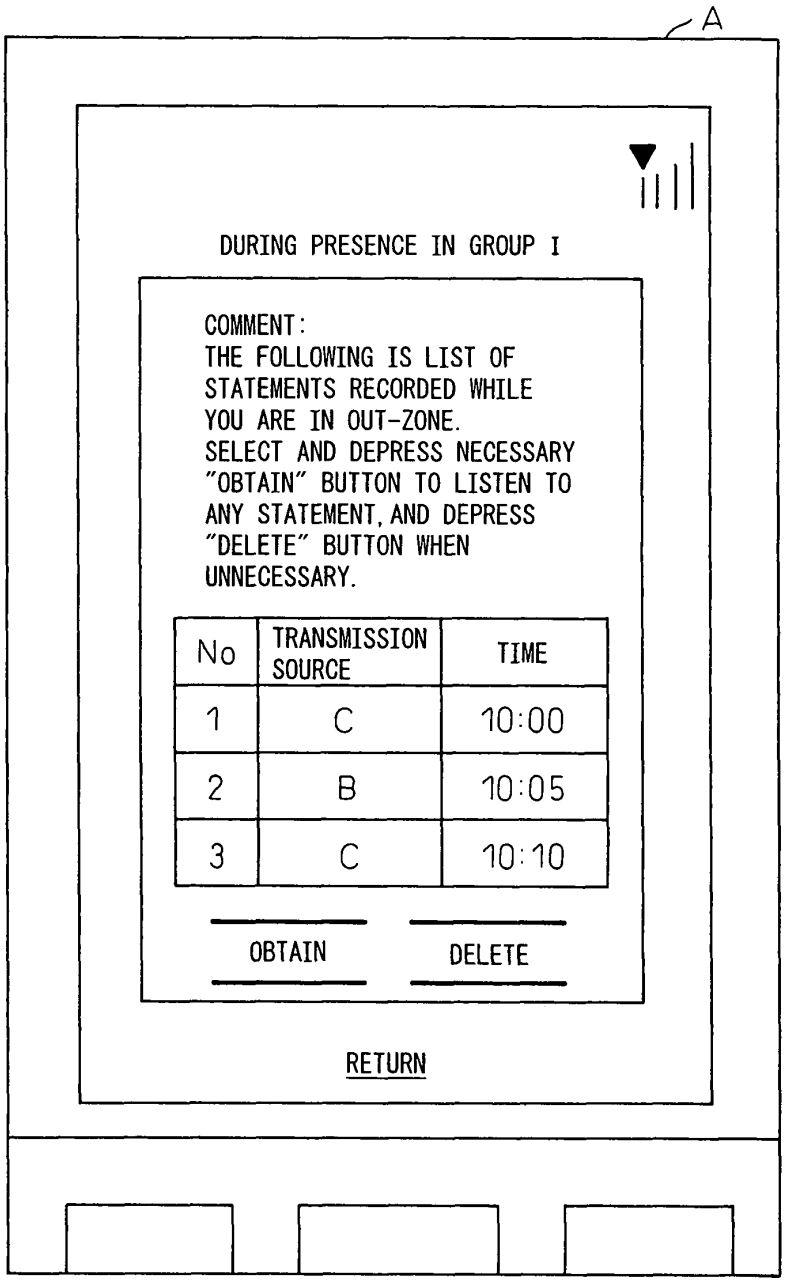

A
DURING PRESENCE IN GROUP I
COMMENT:
THE FOLLOWING IS LIST OF STATEMENTS RECORDED WHILE YOU ARE IN OUT-ZONE.
SELECT AND DEPRESS NECESSARY "OBTAIN" BUTTON TO LISTEN TO ANY STATEMENT, AND DEPRESS "DELETE" BUTTON WHEN UNNECESSARY.
No
TRANSMISSION SOURCE
TIME
1
C
10:00
2
B
10:05
3
C
10:10
OBTAIN
DELETE
RETURN

Fig.19

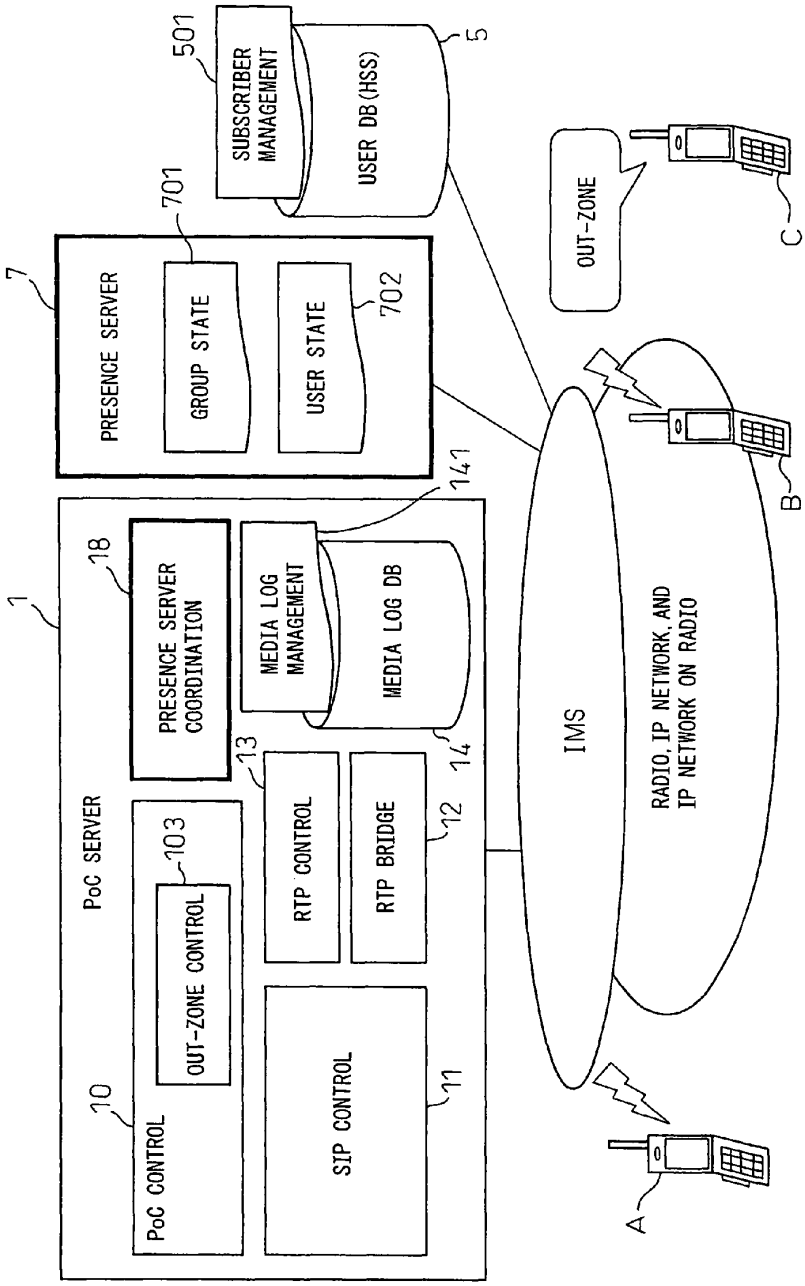

501
SUBSCRIBER MANAGEMENT
USER DB (HSS)
5
701
7
PRESENCE SERVER
GROUP STATE
USER STATE
702
141
1
18
PRESENCE SERVER COORDINATION
MEDIA LOG MANAGEMENT
MEDIA LOG DB
13
14
PoC SERVER
103
OUT-ZONE CONTROL
RTP CONTROL
RTP BRIDGE
12
10
PoC CONTROL
SIP CONTROL
11
IMS
RADIO, IP NETWORK, AND IP NETWORK ON RADIO
OUT-ZONE
A
B
C

Fig.20

USER STATE TABLE

702

USER	STATE	FINAL CONFIRMATION TIME
A	INITIAL STATE	—
B	IN-ZONE	10 : 05
C	OUT-ZONE	9 : 55
D	ABSENCE	10 : 00

Fig. 21

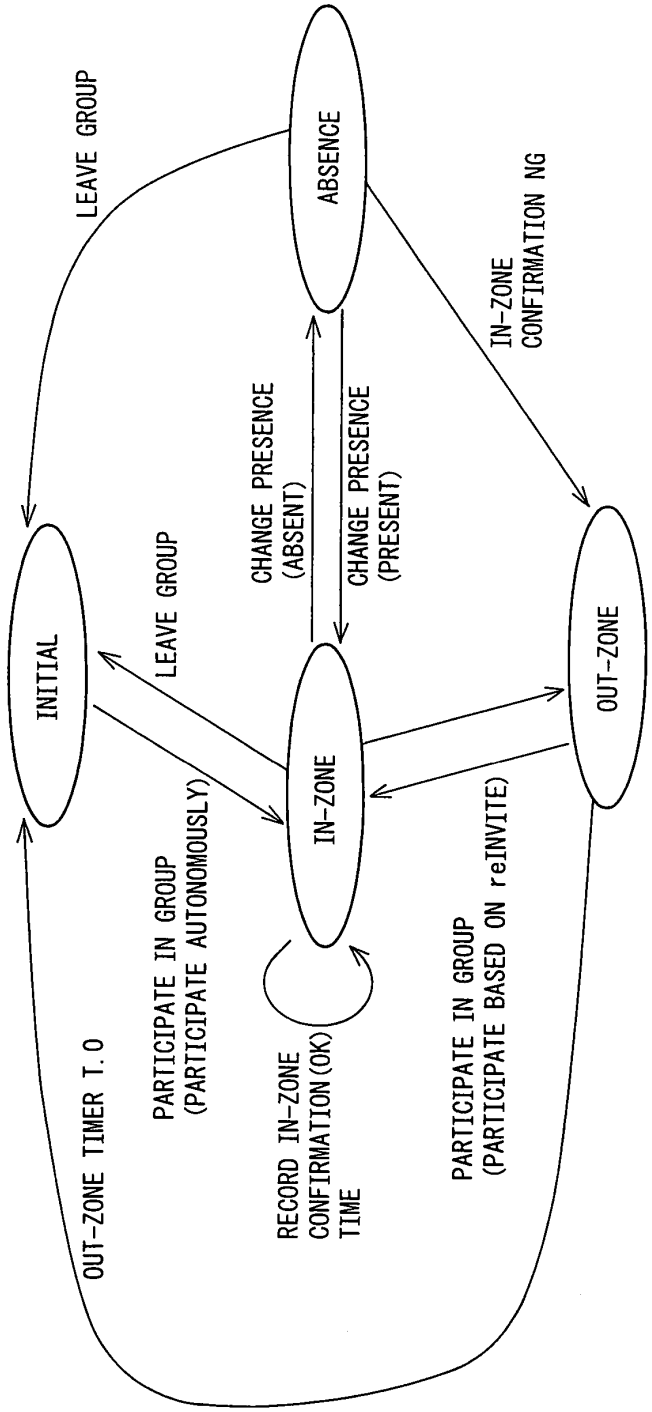

INITIAL
ABSENCE
IN-ZONE
OUT-ZONE
LEAVE GROUP
LEAVE GROUP
CHANGE PRESENCE (ABSENT)
CHANGE PRESENCE (PRESENT)
IN-ZONE CONFIRMATION NG
PARTICIPATE IN GROUP (PARTICIPATE AUTONOMOUSLY)
RECORD IN-ZONE CONFIRMATION (OK) TIME
PARTICIPATE IN GROUP (PARTICIPATE BASED ON reINVITE)
OUT-ZONE TIMER T.O

Fig. 22A

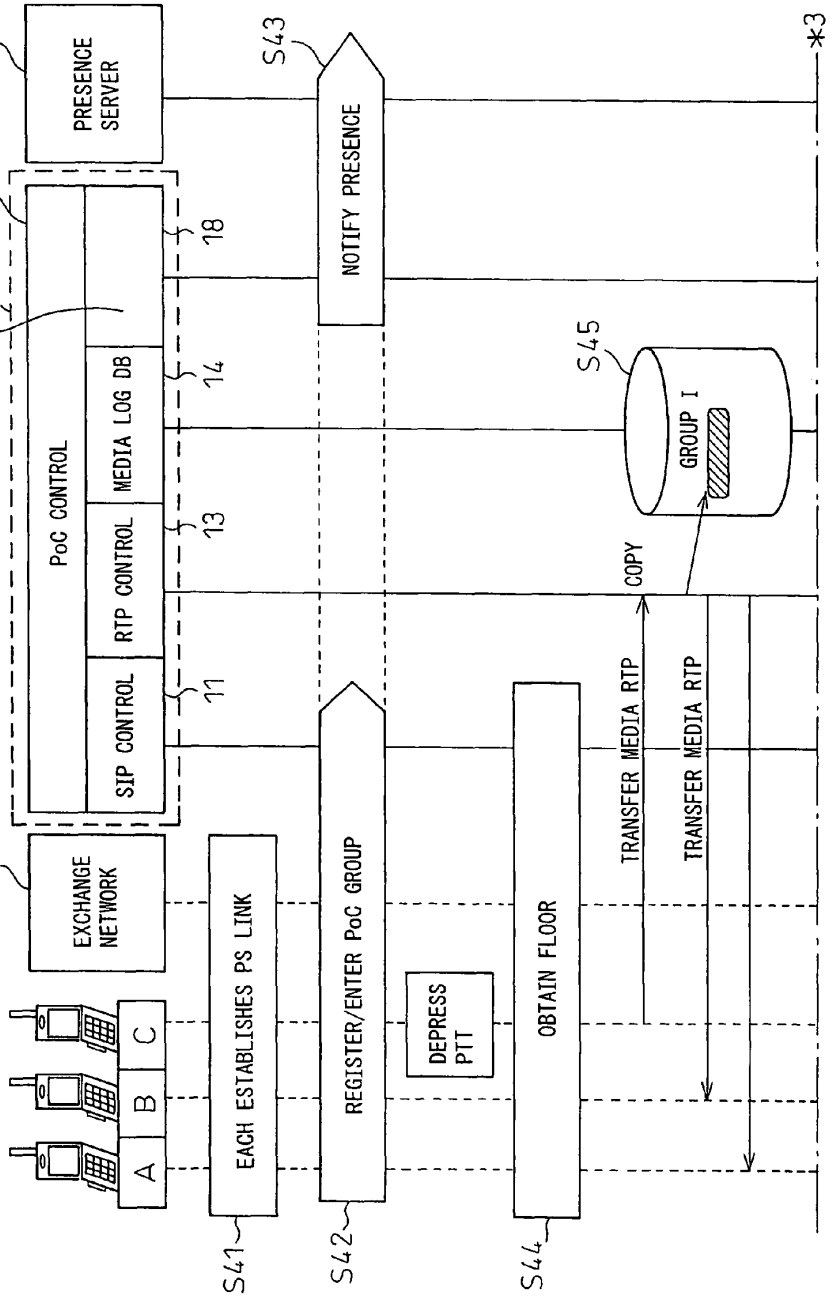

PRESENCE SERVER
7
PRESENCE SERVER COORDINATING UNIT
1
10
PoC CONTROL
SIP CONTROL
RTP CONTROL
MEDIA LOG DB
11
13
14
18
EXCHANGE NETWORK
2
A
B
C
EACH ESTABLISHES PS LINK
S41
REGISTER/ENTER PoC GROUP
S42
NOTIFY PRESENCE
S43
DEPRESS PTT
OBTAIN FLOOR
S44
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
COPY
GROUP I
S45
*3

Fig. 22B

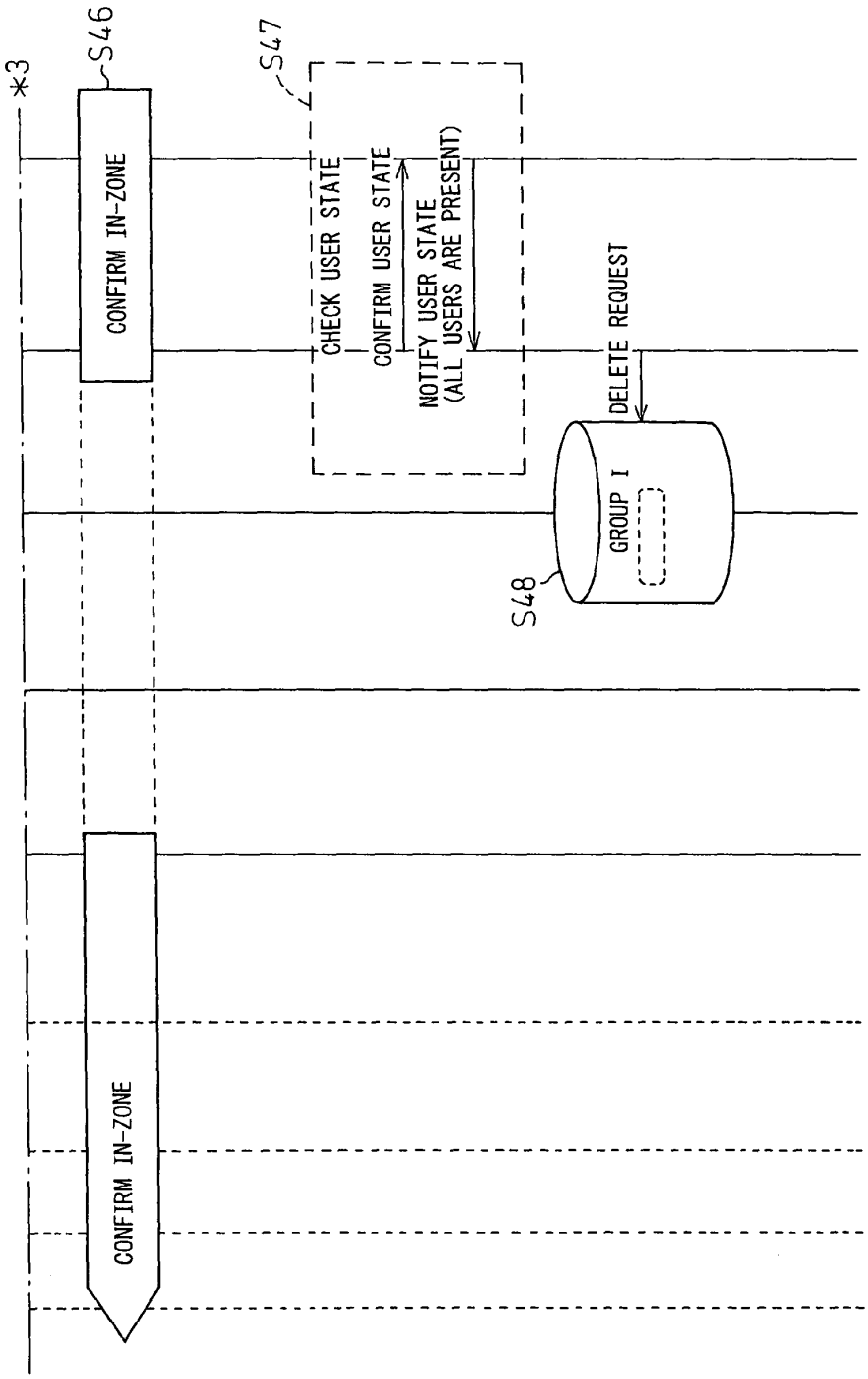

*3
S46
CONFIRM IN-ZONE
S47
CHECK USER STATE
CONFIRM USER STATE
NOTIFY USER STATE
(ALL USERS ARE PRESENT)
DELETE REQUEST
S48
GROUP I
CONFIRM IN-ZONE

Fig. 23

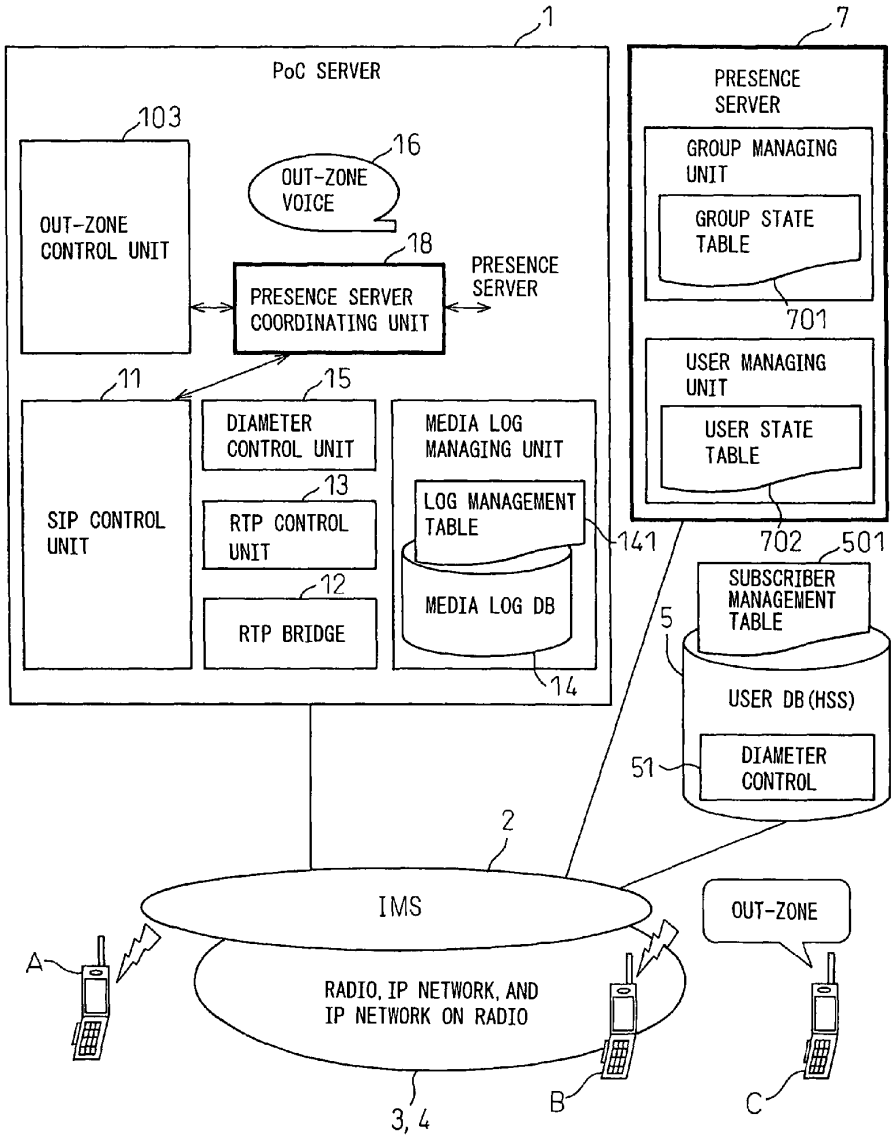

1
PoC SERVER
103
OUT-ZONE CONTROL UNIT
16
OUT-ZONE VOICE
18
PRESENCE SERVER COORDINATING UNIT
PRESENCE SERVER
11
SIP CONTROL UNIT
15
DIAMETER CONTROL UNIT
13
RTP CONTROL UNIT
12
RTP BRIDGE
MEDIA LOG MANAGING UNIT
LOG MANAGEMENT TABLE
141
MEDIA LOG DB
14
7
PRESENCE SERVER
GROUP MANAGING UNIT
GROUP STATE TABLE
701
USER MANAGING UNIT
USER STATE TABLE
702
501
SUBSCRIBER MANAGEMENT TABLE
5
USER DB (HSS)
51
DIAMETER CONTROL
2
IMS
RADIO, IP NETWORK, AND IP NETWORK ON RADIO
3, 4
A
B
C
OUT-ZONE

Fig.24A

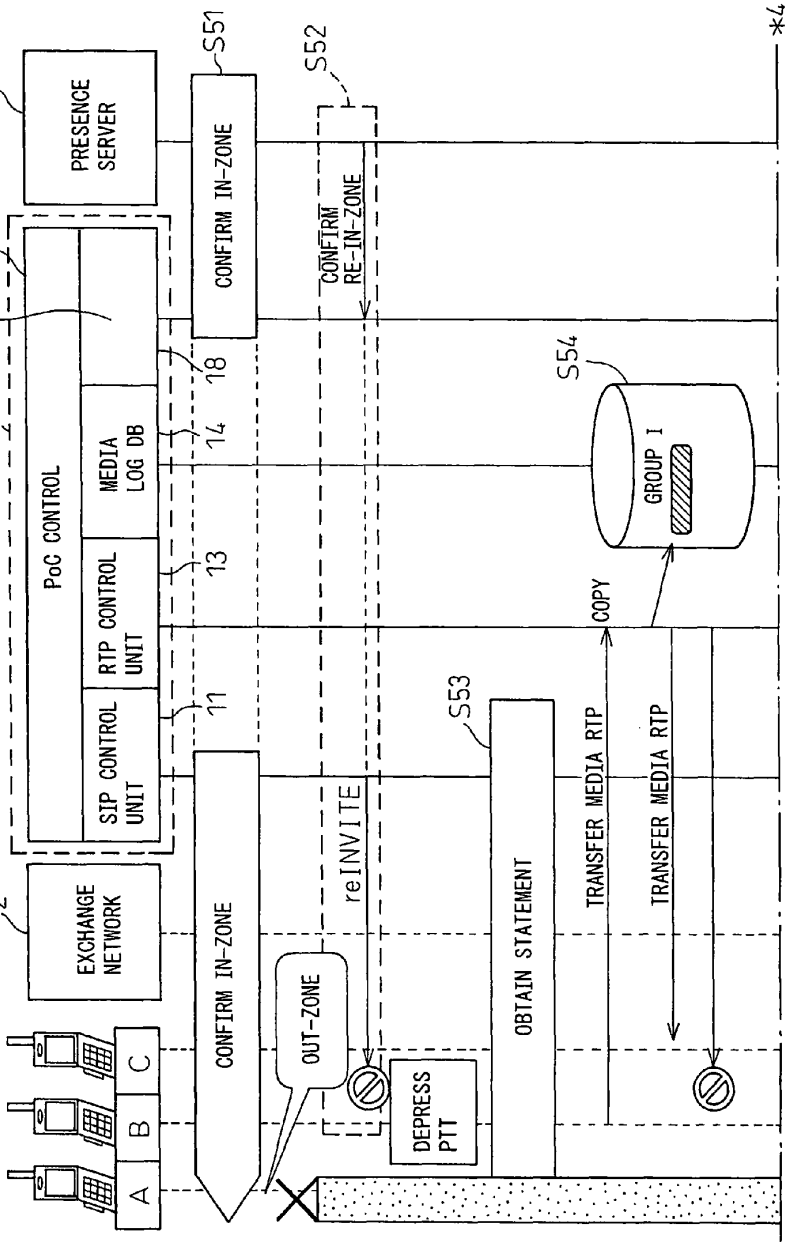

PRESENCE SERVER COORDINATING UNIT
1
10
7
PRESENCE SERVER
PoC CONTROL
SIP CONTROL UNIT
RTP CONTROL UNIT
MEDIA LOG DB
11
13
14
18
2
EXCHANGE NETWORK
A
B
C
CONFIRM IN-ZONE
S51
CONFIRM IN-ZONE
OUT-ZONE
reINVITE
S52
CONFIRM RE-IN-ZONE
DEPRESS PTT
S53
OBTAIN STATEMENT
TRANSFER MEDIA RTP
COPY
S54
GROUP I
TRANSFER MEDIA RTP
*4

Fig.24B

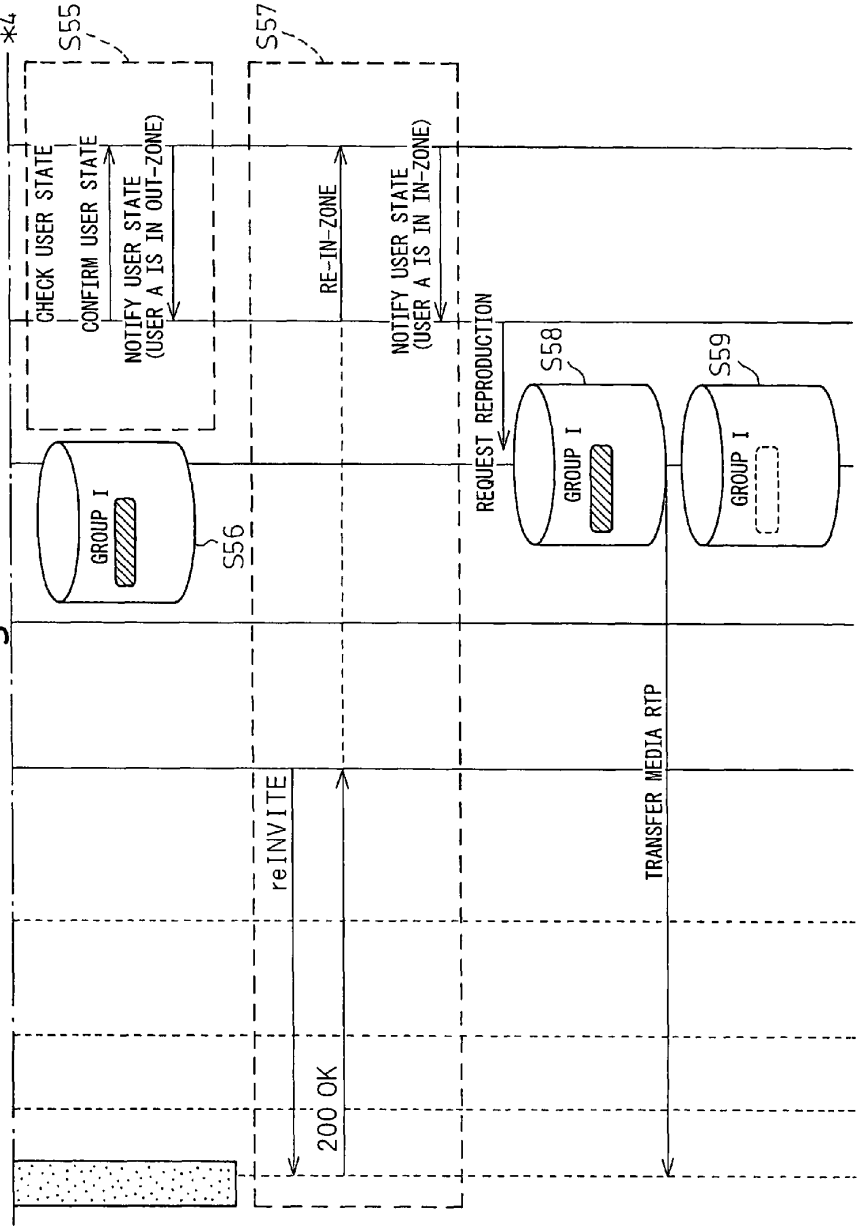

*4
S55
S57
CHECK USER STATE
CONFIRM USER STATE
NOTIFY USER STATE (USER A IS IN OUT-ZONE)
RE-IN-ZONE
NOTIFY USER STATE (USER A IS IN IN-ZONE)
REQUEST REPRODUCTION
S58
S59
GROUP I
GROUP I
GROUP I
S56
reINVITE
200 OK
TRANSFER MEDIA RTP

Fig.25A

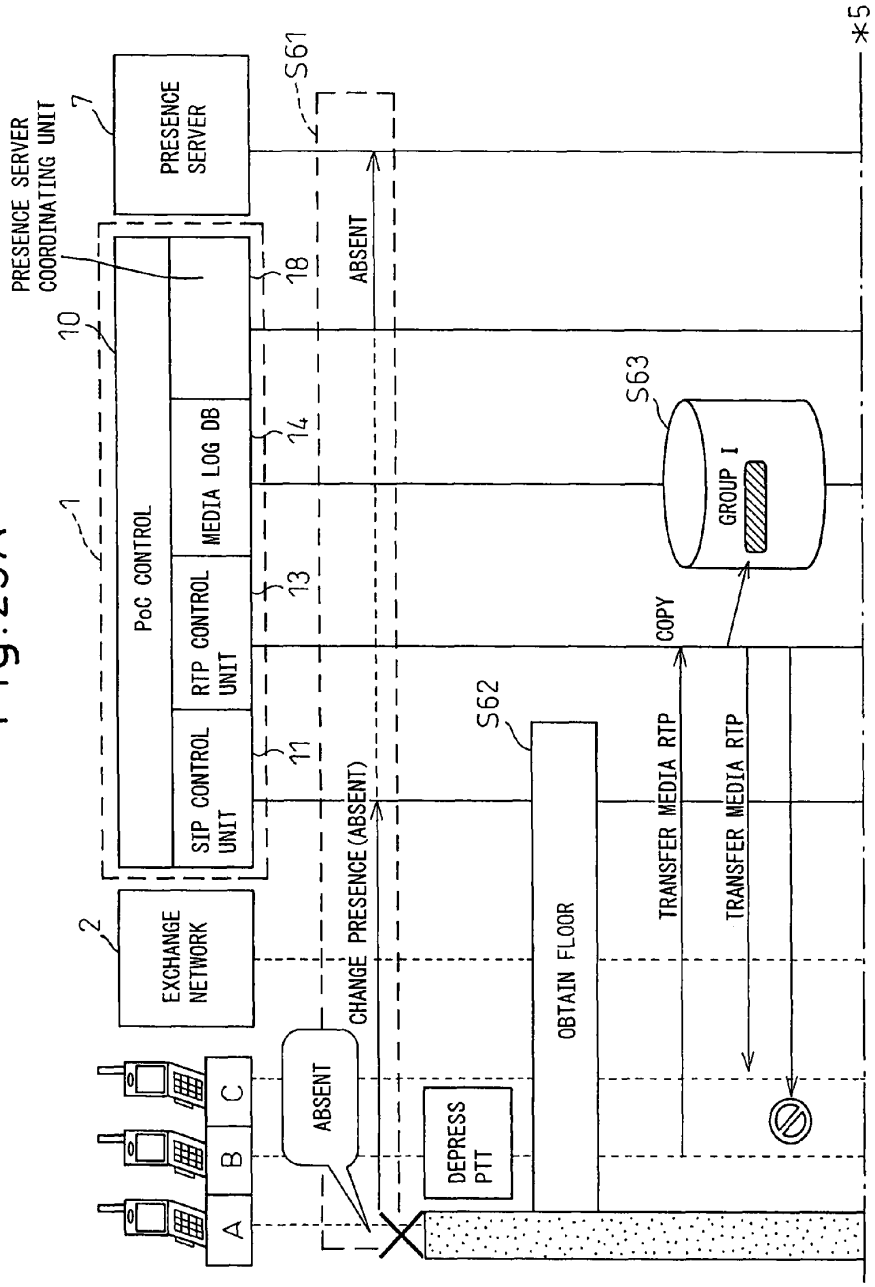

PRESENCE SERVER COORDINATING UNIT
7
PRESENCE SERVER
S61
*5
10
18
ABSENT
1
PoC CONTROL
MEDIA LOG DB
14
S63
GROUP I
13
RTP CONTROL UNIT
COPY
S62
11
SIP CONTROL UNIT
2
EXCHANGE NETWORK
CHANGE PRESENCE (ABSENT)
OBTAIN FLOOR
TRANSFER MEDIA RTP
TRANSFER MEDIA RTP
A
B
C
ABSENT
DEPRESS PTT

Fig.25B

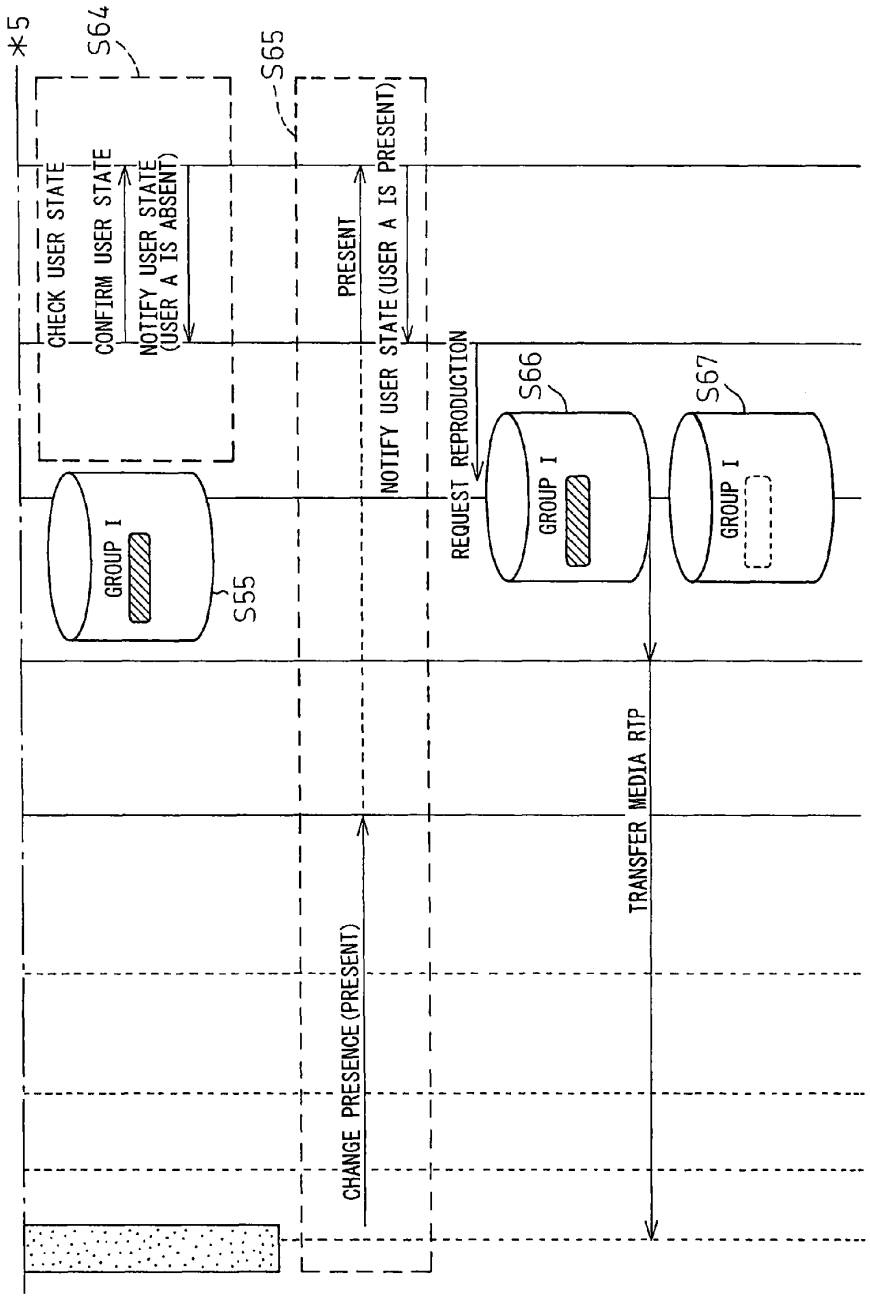

*5
S64
S65
CHECK USER STATE
CONFIRM USER STATE
NOTIFY USER STATE (USER A IS ABSENT)
PRESENT
NOTIFY USER STATE (USER A IS PRESENT)
REQUEST REPRODUCTION
S66
S67
GROUP I
GROUP I
GROUP I
S55
TRANSFER MEDIA RTP
CHANGE PRESENCE (PRESENT)

Fig. 26

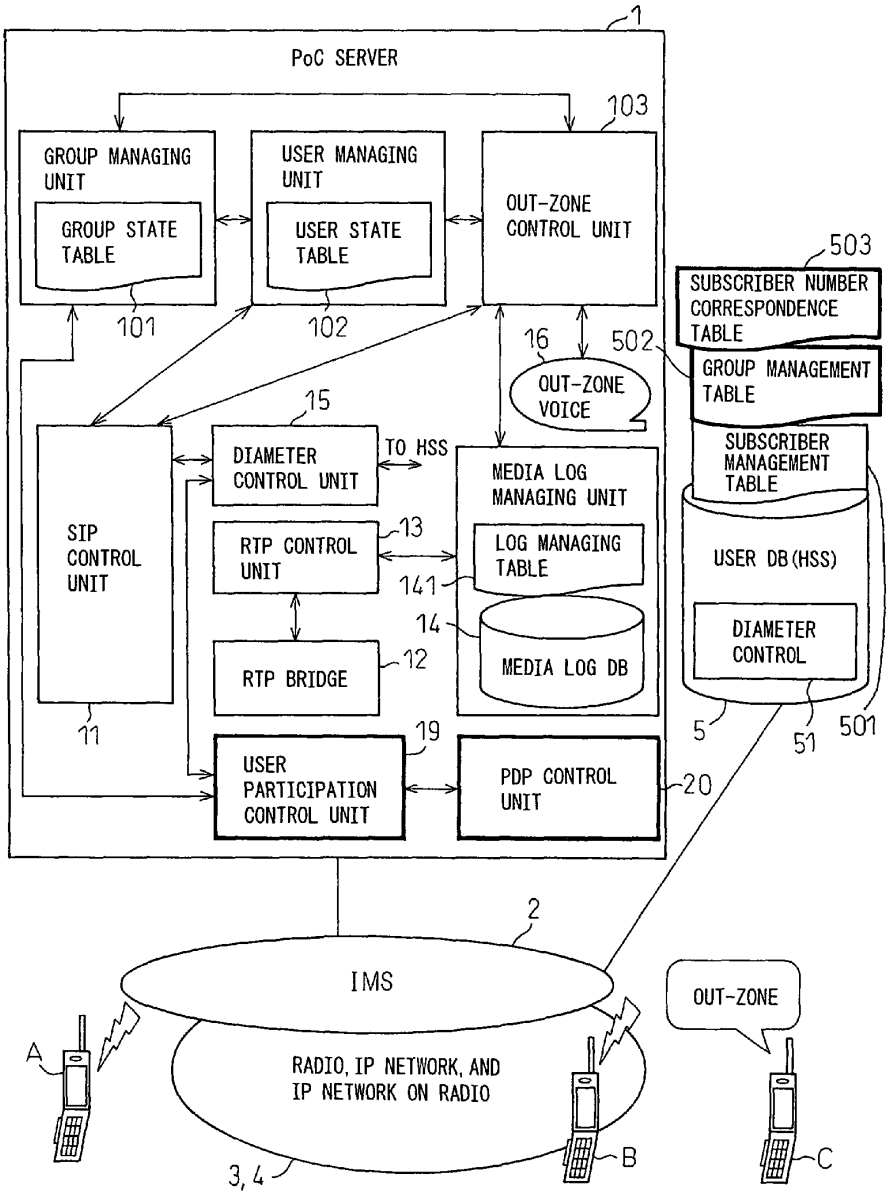

1
PoC SERVER
103
GROUP MANAGING UNIT
GROUP STATE TABLE
USER MANAGING UNIT
USER STATE TABLE
OUT-ZONE CONTROL UNIT
101
102
16
OUT-ZONE VOICE
503
SUBSCRIBER NUMBER CORRESPONDENCE TABLE
502
GROUP MANAGEMENT TABLE
SUBSCRIBER MANAGEMENT TABLE
15
DIAMETER CONTROL UNIT
TO HSS
MEDIA LOG MANAGING UNIT
SIP CONTROL UNIT
RTP CONTROL UNIT
13
LOG MANAGING TABLE
141
14
MEDIA LOG DB
RTP BRIDGE
12
USER DB (HSS)
DIAMETER CONTROL
11
5
51
501
19
USER PARTICIPATION CONTROL UNIT
PDP CONTROL UNIT
20
2
IMS
OUT-ZONE
A
RADIO, IP NETWORK, AND IP NETWORK ON RADIO
B
C
3, 4

Fig. 27A

GROUP MANAGEMENT TABLE

502

GROUP	COMPULSORY PARTICIPATION FUNCTION
I	PRESENT
II	ABSENT
III	ABSENT
IV	ABSENT

Fig. 27B

SUBSCRIBER NUMBER CORRESPONDENCE TABLE

503

USER	IMUI
A	8190xxxxxxxx
B	8190yyyyyyyy
C	8190zzzzzzzz

Fig.28A

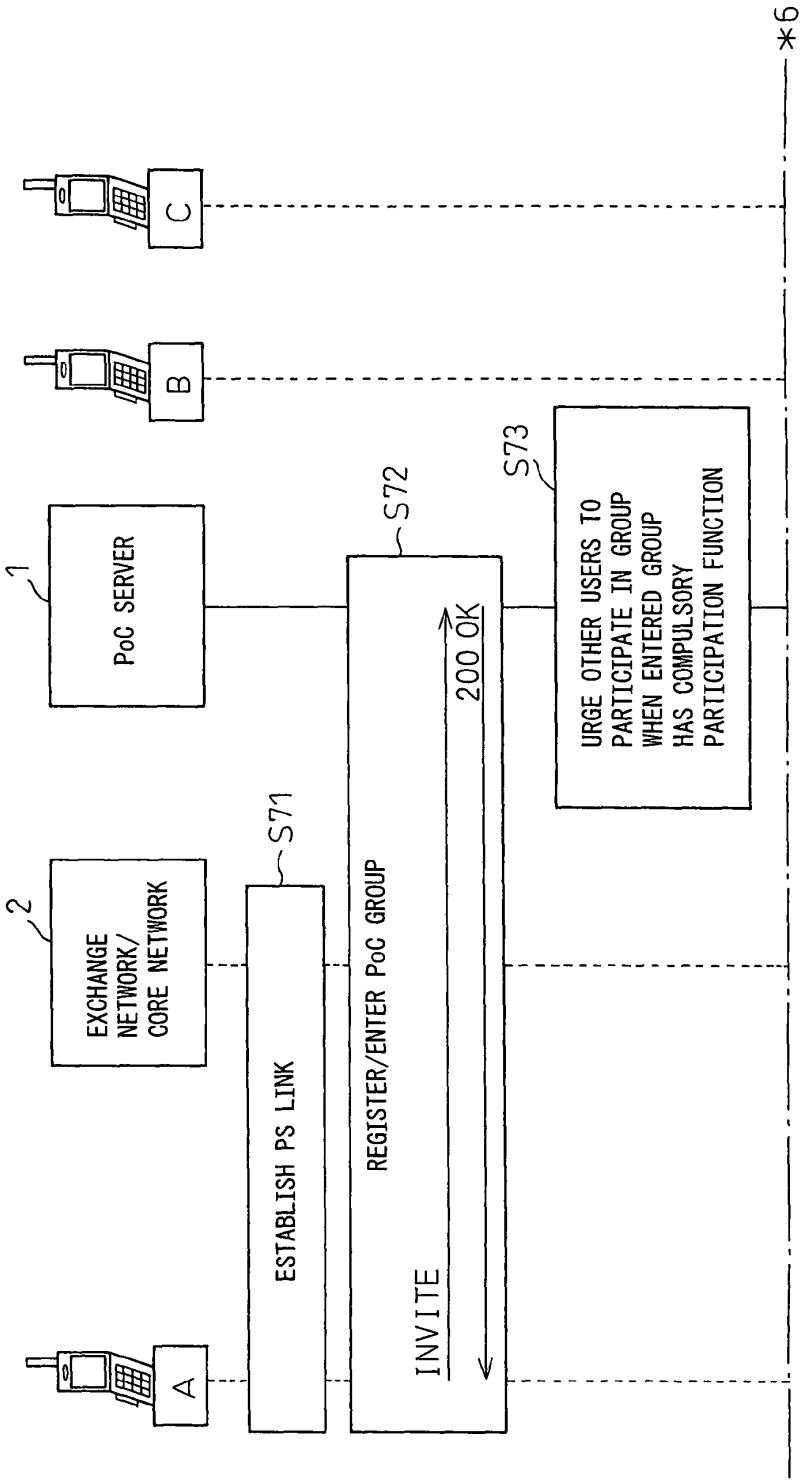

A
B
C
2
EXCHANGE NETWORK/ CORE NETWORK
1
PoC SERVER
S71
ESTABLISH PS LINK
S72
REGISTER/ENTER PoC GROUP
INVITE
200 OK
S73
URGE OTHER USERS TO PARTICIPATE IN GROUP WHEN ENTERED GROUP HAS COMPULSORY PARTICIPATION FUNCTION
*6

Fig.28B

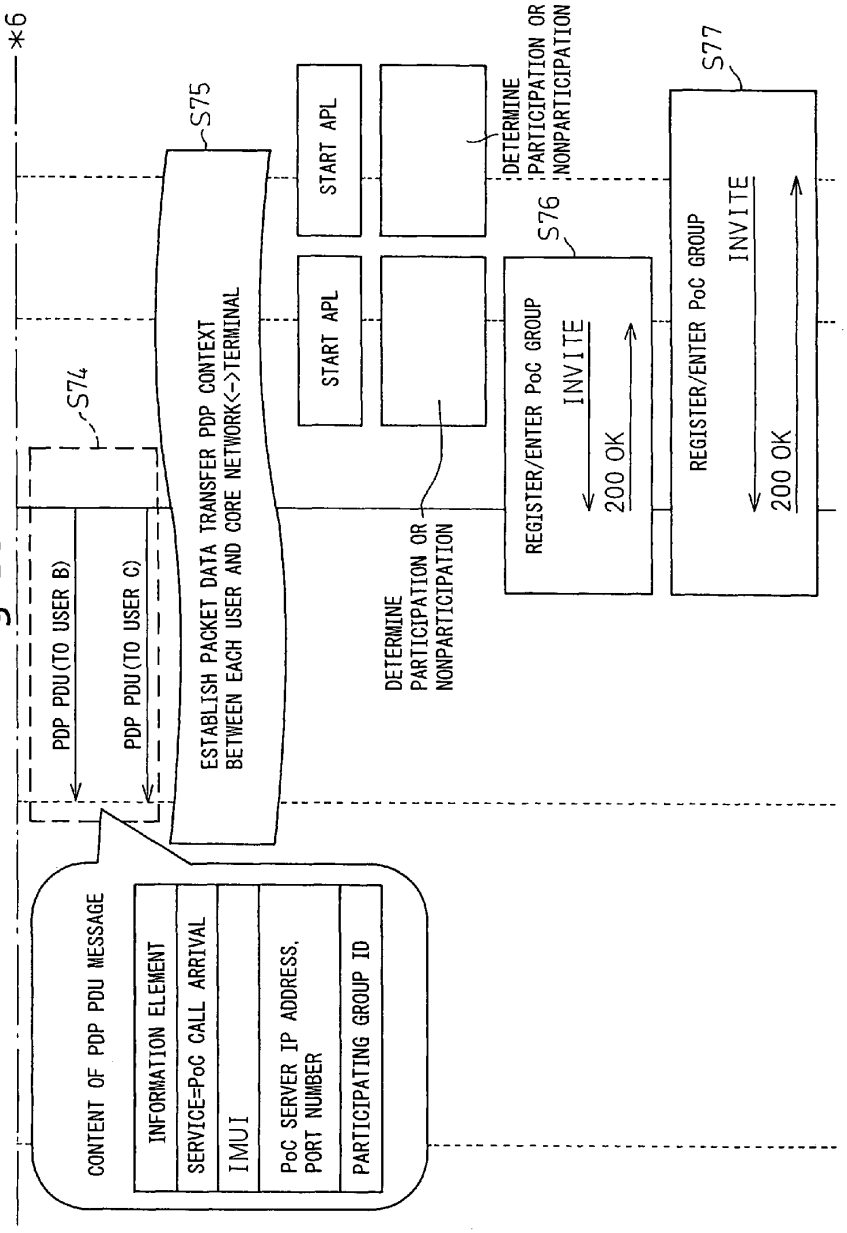

*6
S74
PDP PDU(TO USER B)
PDP PDU(TO USER C)
S75
ESTABLISH PACKET DATA TRANSFER PDP CONTEXT BETWEEN EACH USER AND CORE NETWORK<->TERMINAL
START APL
START APL
DETERMINE PARTICIPATION OR NONPARTICIPATION
DETERMINE PARTICIPATION OR NONPARTICIPATION
S76
REGISTER/ENTER PoC GROUP
INVITE
200 OK
S77
REGISTER/ENTER PoC GROUP
INVITE
200 OK
CONTENT OF PDP PDU MESSAGE
INFORMATION ELEMENT
SERVICE=PoC CALL ARRIVAL
IMUI
PoC SERVER IP ADDRESS, PORT NUMBER
PARTICIPATING GROUP ID

Fig. 29

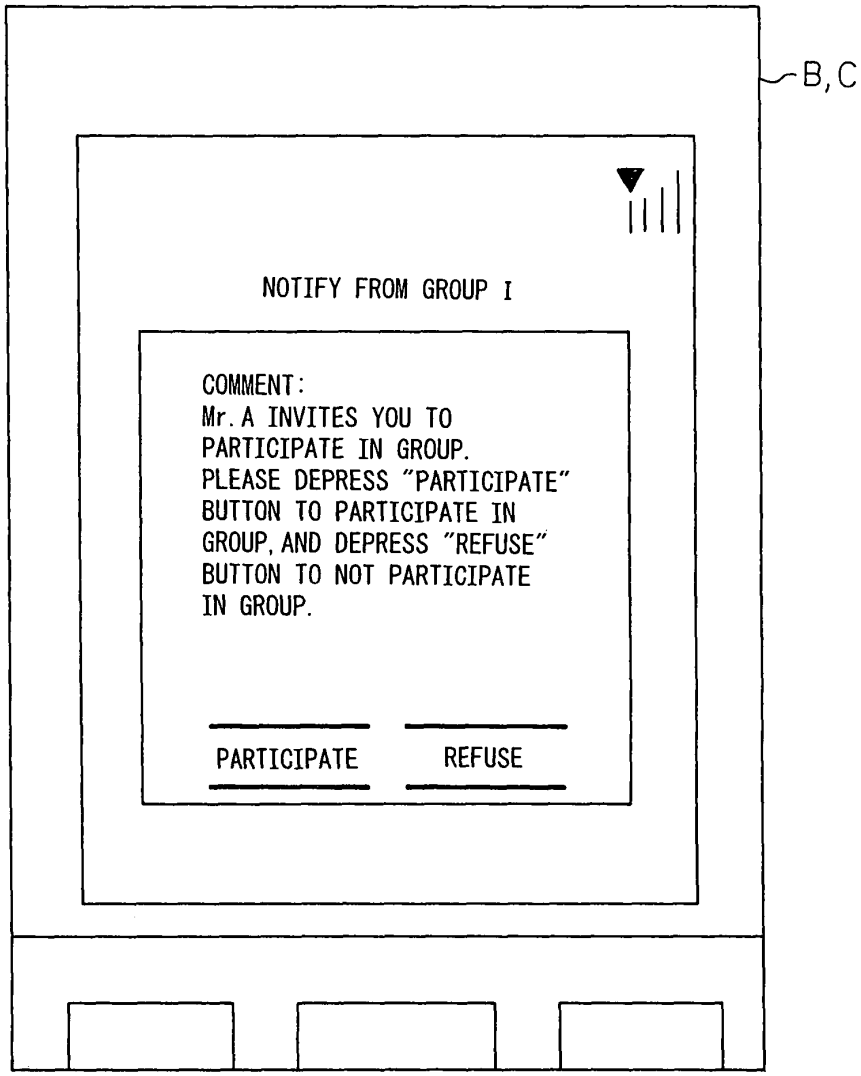

B, C
NOTIFY FROM GROUP I
COMMENT:
Mr. A INVITES YOU TO
PARTICIPATE IN GROUP.
PLEASE DEPRESS "PARTICIPATE"
BUTTON TO PARTICIPATE IN
GROUP, AND DEPRESS "REFUSE"
BUTTON TO NOT PARTICIPATE
IN GROUP.
PARTICIPATE
REFUSE

Fig.30

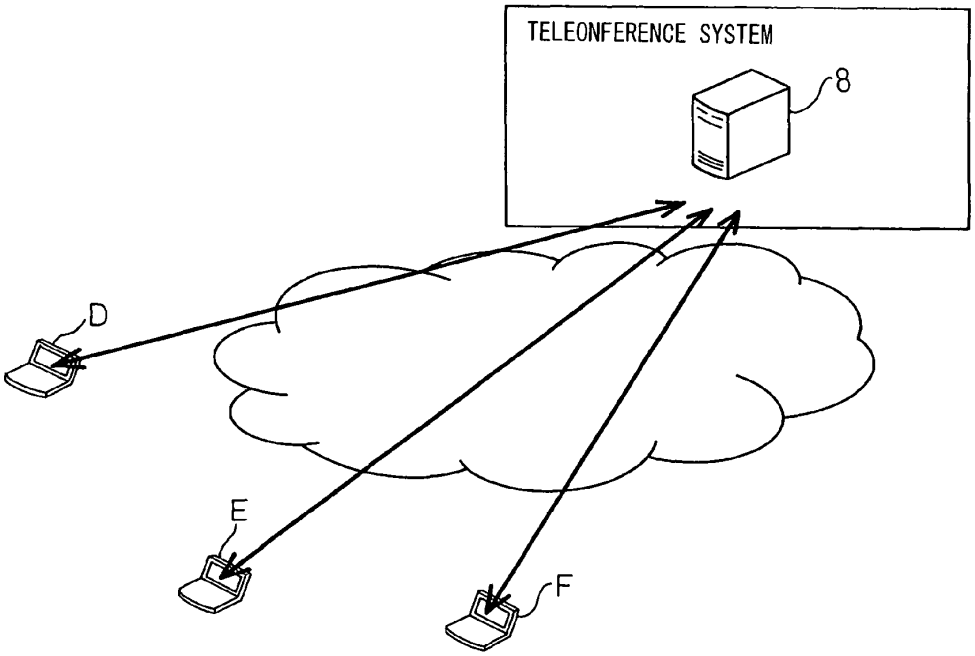


Fig.31

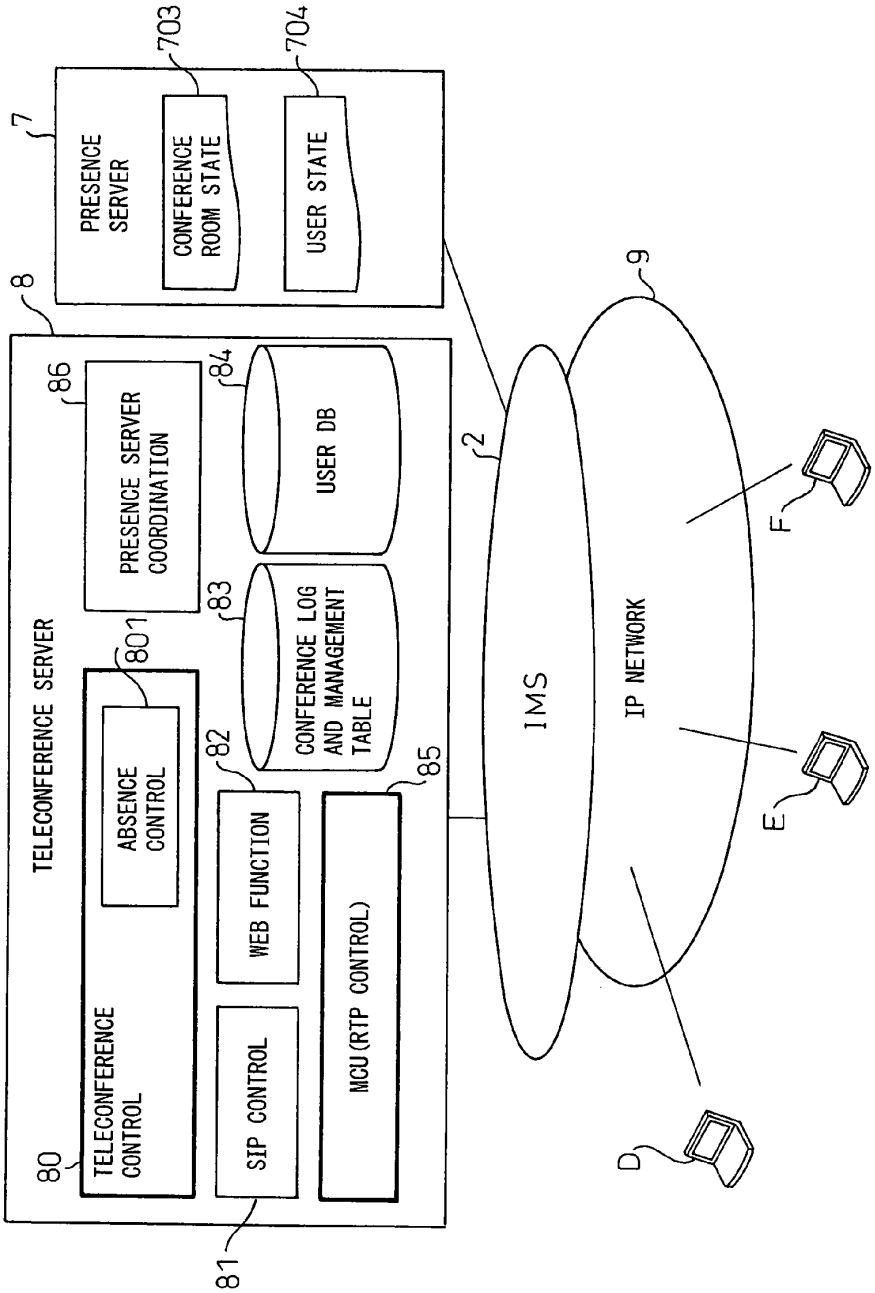

PRESENCE SERVER
7
CONFERENCE ROOM STATE
703
USER STATE
704
8
TELECONFERENCE SERVER
PRESENCE SERVER COORDINATION
86
USER DB
84
CONFERENCE LOG AND MANAGEMENT TABLE
83
ABSENCE CONTROL
801
TELECONFERENCE CONTROL
80
WEB FUNCTION
82
SIP CONTROL
81
MCU (RTP CONTROL)
85
2
IMS
IP NETWORK
9
D
E
F

Fig.32A

CONFERENCE ROOM STATE TABLE 703

CONFERENCE ROOM	CONFERENCE ROOM STATE
I	CONFERENCE ROOM ACTIVE
II	INITIAL STATE
III	INITIAL STATE

Fig.32B

USER STATE TABLE 704

USER	STATE	FINAL CONFIRMATION TIME
D	INITIAL	-
E	PRESENT	10 : 05
F	ABSENT	9 : 55

Fig.32C

CONFERENCE LOG MANAGEMENT TABLE 83

	TRANSMISSION SOURCE	TIME	DATA FILE
I	D	9 : 45	DISCARD
I	D	9 : 50	DISCARD
I	E	9 : 55	DISCARD
I	D	10 : 00	DATA 1
I	E	10 : 05	DATA 2

Fig.33

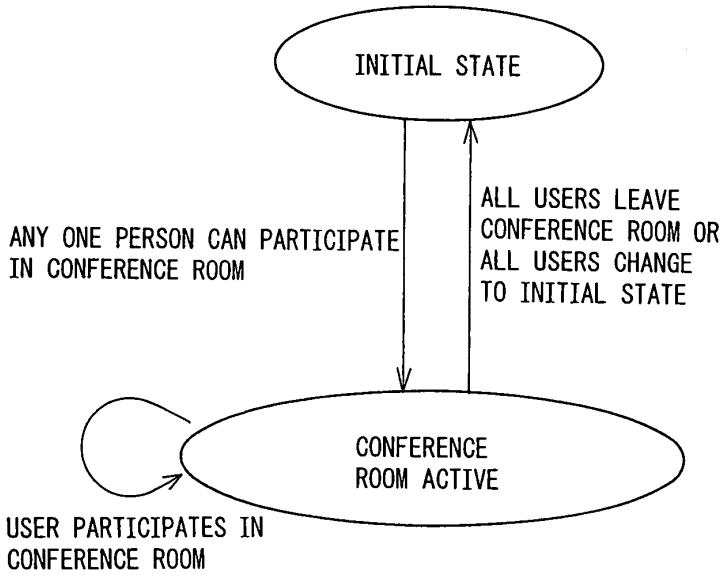

INITIAL STATE
ANY ONE PERSON CAN PARTICIPATE IN CONFERENCE ROOM
ALL USERS LEAVE CONFERENCE ROOM OR ALL USERS CHANGE TO INITIAL STATE
CONFERENCE ROOM ACTIVE
USER PARTICIPATES IN CONFERENCE ROOM

Fig.34

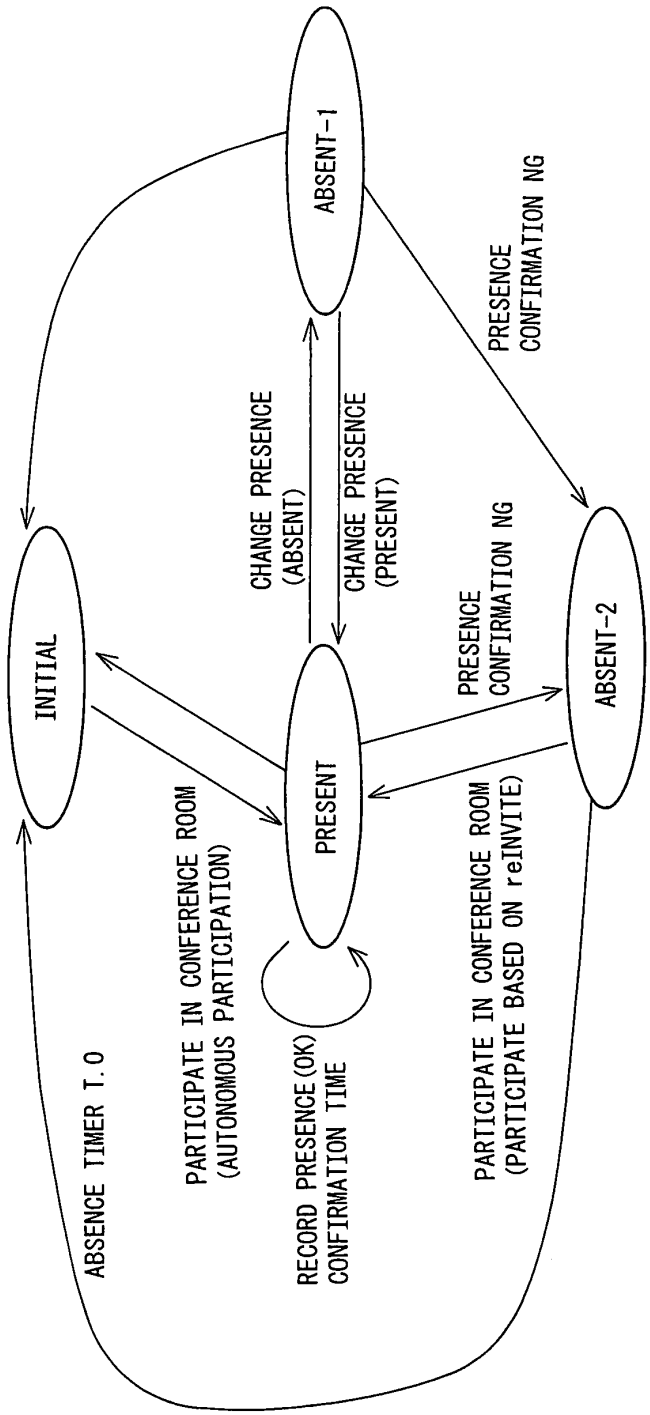

INITIAL
ABSENT-1
PRESENT
ABSENT-2
CHANGE PRESENCE (ABSENT)
CHANGE PRESENCE (PRESENT)
PRESENCE CONFIRMATION NG
PRESENCE CONFIRMATION NG
PARTICIPATE IN CONFERENCE ROOM (AUTONOMOUS PARTICIPATION)
RECORD PRESENCE(OK) CONFIRMATION TIME
PARTICIPATE IN CONFERENCE ROOM (PARTICIPATE BASED ON reINVITE)
ABSENCE TIMER T.O

Fig.35

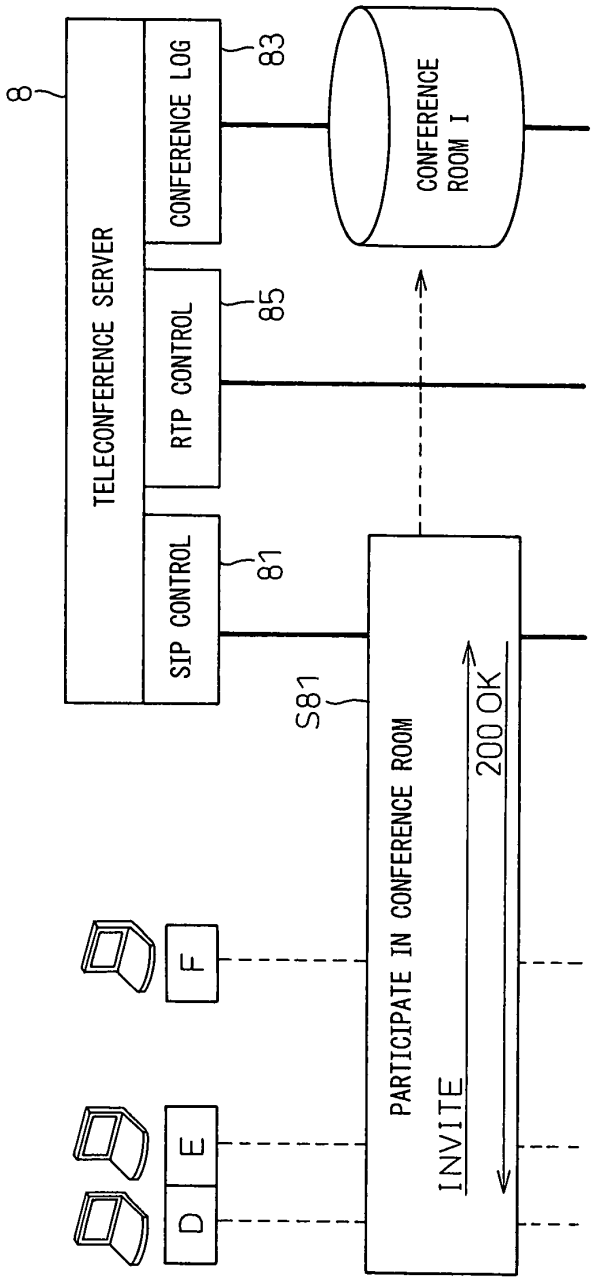

8
TELECONFERENCE SERVER
SIP CONTROL
81
RTP CONTROL
85
CONFERENCE LOG
83
CONFERENCE ROOM I
S81
PARTICIPATE IN CONFERENCE ROOM
INVITE
200 OK
D
E
F

Fig.36

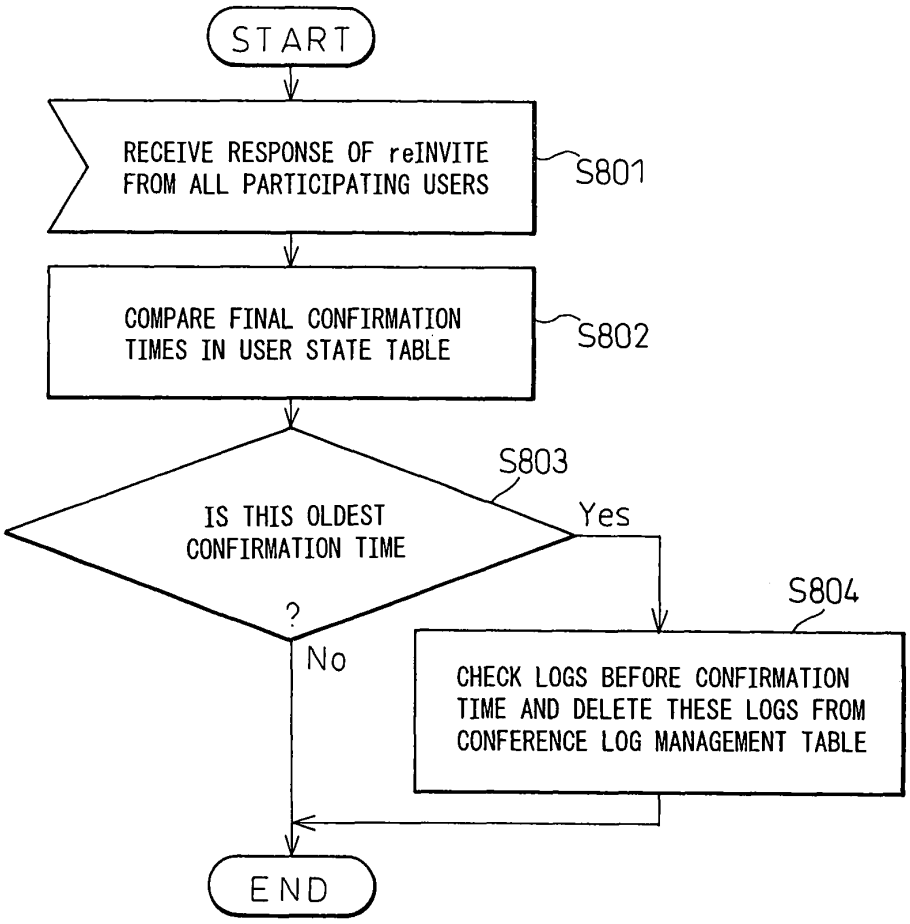

START
RECEIVE RESPONSE OF reINVITE FROM ALL PARTICIPATING USERS
S801
COMPARE FINAL CONFIRMATION TIMES IN USER STATE TABLE
S802
S803
IS THIS OLDEST CONFIRMATION TIME ?
Yes
No
S804
CHECK LOGS BEFORE CONFIRMATION TIME AND DELETE THESE LOGS FROM CONFERENCE LOG MANAGEMENT TABLE
END

Fig.37

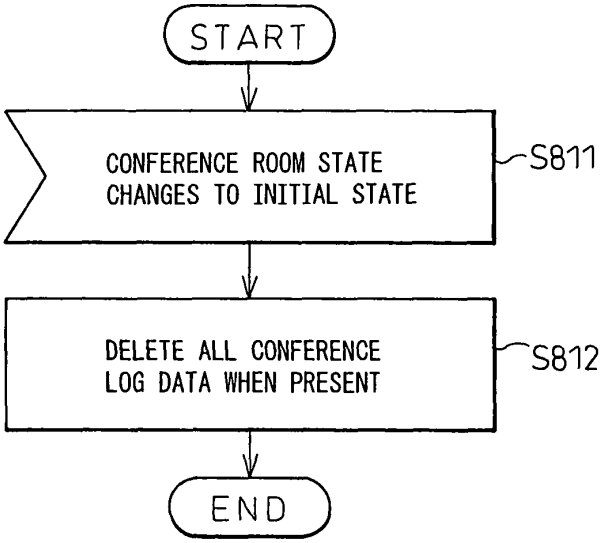

START
CONFERENCE ROOM STATE CHANGES TO INITIAL STATE
S811
DELETE ALL CONFERENCE LOG DATA WHEN PRESENT
S812
END

Fig.38

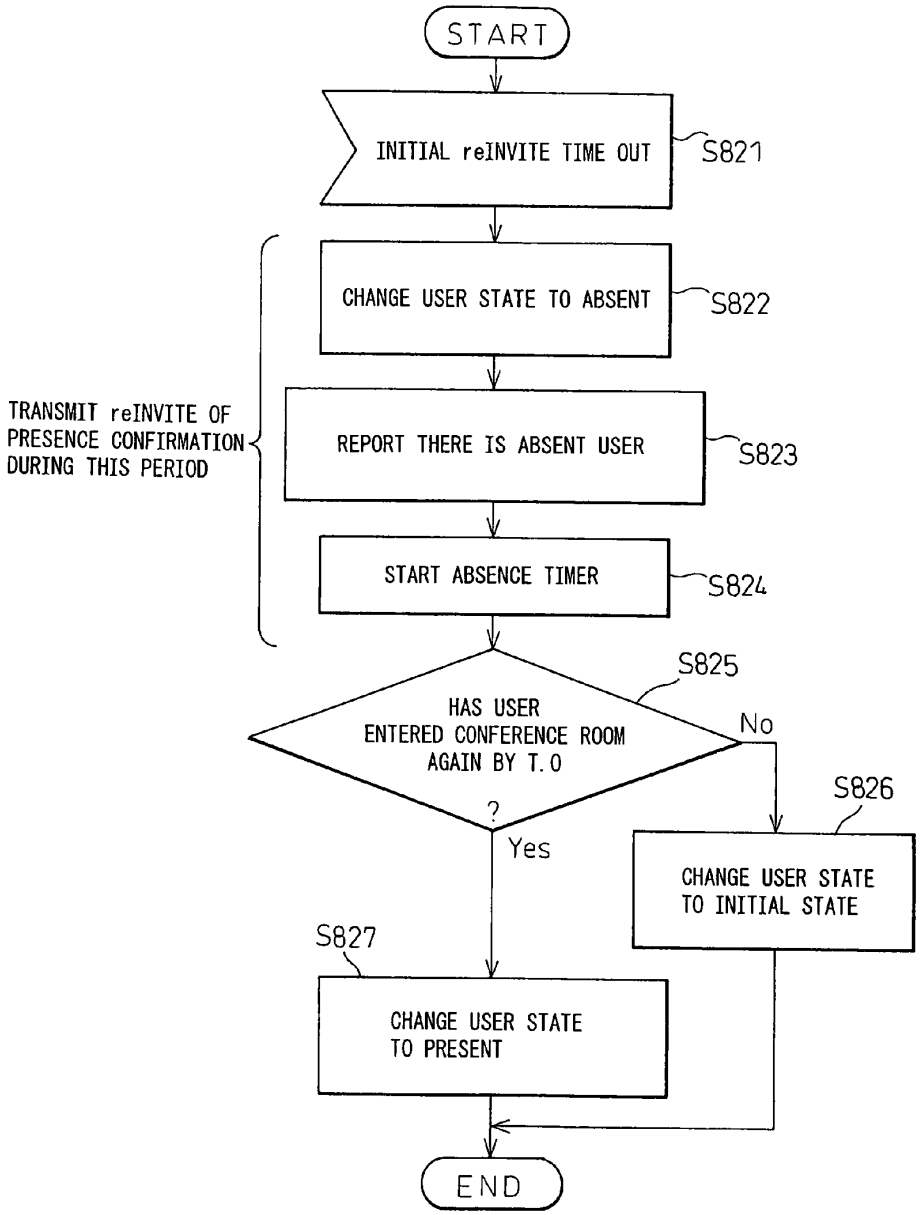
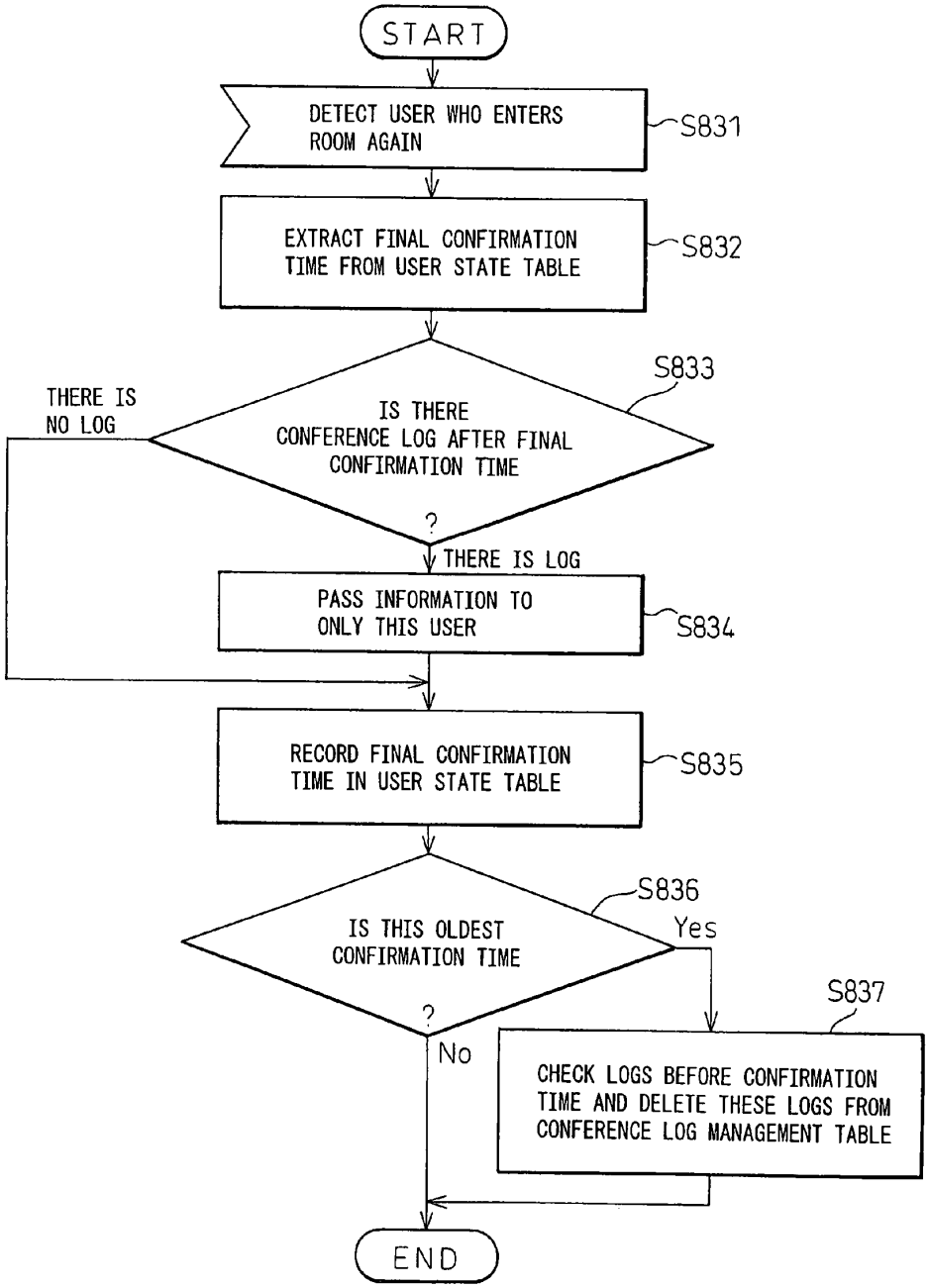

START
INITIAL reINVITE TIME OUT
S821
CHANGE USER STATE TO ABSENT
S822
TRANSMIT reINVITE OF PRESENCE CONFIRMATION DURING THIS PERIOD
REPORT THERE IS ABSENT USER
S823
START ABSENCE TIMER
S824
S825
HAS USER ENTERED CONFERENCE ROOM AGAIN BY T.O ?
No
Yes
S826
CHANGE USER STATE TO INITIAL STATE
S827
CHANGE USER STATE TO PRESENT
END

Fig.39


START
DETECT USER WHO ENTERS ROOM AGAIN
S831
EXTRACT FINAL CONFIRMATION TIME FROM USER STATE TABLE
S832
S833
THERE IS NO LOG
IS THERE CONFERENCE LOG AFTER FINAL CONFIRMATION TIME ?
THERE IS LOG
PASS INFORMATION TO ONLY THIS USER
S834
RECORD FINAL CONFIRMATION TIME IN USER STATE TABLE
S835
S836
IS THIS OLDEST CONFIRMATION TIME ?
Yes
No
S837
CHECK LOGS BEFORE CONFIRMATION TIME AND DELETE THESE LOGS FROM CONFERENCE LOG MANAGEMENT TABLE
END

CONTENTS SERVER AND CONTENTS SERVER SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation application and is based upon PCT/JP2005/005938, filed on Mar. 29, 2005. (which claims priority from International Application No. PCT/JP2004/016670, filed on Nov. 10, 2004.)

TECHNICAL FIELD

The present invention relates to a contents server and a contents server system. Particularly, the invention relates to a PoC server and a PoC server system that provide a PoC (Push to talk over Cellular) service to enable a user to use a portable terminal present in a radio communication area as a transceiver (PTT: Push to Talk). Further, the present invention relates to a meeting server and a meeting system that provide a meeting service such as an audio teleconference and videoconference via an IP network.

BACKGROUND ART

With the recent increase in use of portable telephones, there has been an increasing demand for new services such as high-speed data communication for transferring images and moving pictures, in addition to conventional one-to-one audio communication service. A PoC service in which the 3GPP (the third Generation Partnership Project) produces a fundamental specification is also expected to increase as one such new service (see the Nonpatent Document 1).

FIG. **1** shows one example of a mobile communication system that provides a PoC service. In the present example, a portable telephone having a PTT button as shown in enlargement at the right upper side of the drawing is used for the terminal matching the PoC. When the PoC-matched terminal is used, a user can talk to plural persons within the same group by depressing the PTT button, and can listen to these persons talk by releasing the finger from the PTT button.

In FIG. **1**, a telecommunications business provider that provides the PoC service installs a PoC server **1** within a provider network including an IP packet communication link radio network. When a user dials a number (special number) of a group in which the user wants to participate, using a PoC-matched terminal A or B present in a radio area **3** or **4**, the corresponding PoC-matched terminal A or B first establishes a communication link with the IP packet communication link radio network. Next, the corresponding PoC-matched terminal A or B establishes a communication link with an SIP (Session Initiation Protocol) control unit **11** of the PoC server **1** using this network based on the SIP protocol.

After a communication link is established, when a user A of the PoC-matched terminal A depresses the PTT button and talks, voice is converted into an RTP (Real-time Transport Protocol) packet, and is transmitted to the PoC server **1**. The PoC server **1** multicasts the received RTP packet to PoC-matched terminals B and C that belong to the same group as that of the PoC-matched terminal A, via an RTP bridge unit **12**. In the present example, the PoC-matched terminal C is present in an out-zone in which radio communication is not possible. Therefore, the PoC-matched terminal C cannot receive the RTP packet.

The above PoC server and the PoC service system can be similarly applied to an audio teleconference system and a videoconference system via a network. In this case, when plural conference terminals access a conference server within the IP network and receive an RTP packet containing audio information and image information transmitted from a conference terminal having the conference server, the RTP packet is multicast to conference terminals of other users participating in the same conference.

Nonpatent Document 1: 3GPP TR 23.070 v.0.4.0 (2004-05)

DISCLOSURE OF THE INVENTION

Problems that the Invention is to Solve

As shown in the above example, according to a normal PoC service, a problem exists in that only a user of the PoC-matched terminal C present in the outer communication area is not able to obtain information reported in the same group. This decreases the convenience of sharing in real time the statements from users participating in the same group which the PoC service should basically provide, and decreases service quality as well.

In this case, it is considered possible for the PoC server **1** to store audio information to be reported to the same group, and reproduce and report this audio information to the PoC-matched terminal C after the PoC-matched terminal C enters the radio area. However, for this purpose, a large-capacity storage device that accumulates data from plural users needs to be prepared in the PoC server **1**. Consequently, the cost of providing the PoC service increases.

The same can be also applied to the above conference system. In other words, when a user joining in the conference is temporarily absent or when a user joins the conference in the middle of the conference, the user cannot accurately obtain the interacted information while the user is absent. Therefore, either distributed streaming information needs to be autonomously recorded in individual user terminals, or the conference server needs to record all streaming information during the whole period of the conference.

However, in the former case, the users are forced to carry out a complex recording operation. Further, when the users record all contents of the conference, it is not preferable from a security viewpoint that confidential information be leaked out. In the latter case, the conference server needs to prepare a large log area during each conference. In particular, when information containing a large quantity of audio and image data is recorded at a television conference or the like, cost of the conference service increases.

In the light of the above problems, it is an object of the present invention to provide a contents server and a contents service system capable of securely sharing information from attendant users in the same group or a conference room in a contents service and capable of providing the information at reasonable cost, by providing a unit which accumulates and reproduces audio and image data from plural users and a unit which deletes and updates the accumulated data-based on a state management of each user, in the contents server including a PoC server and a conference server.

Means to Solve the Problems

The present invention provides a contents server including: a recording unit that records media information from plural users in a communicatable state participating in a predetermined group, for each group; a detecting unit that detects at each predetermined time a communicatable state or an uncommunicatable state of each participating user; and a deleting unit that deletes media information the necessity or

unnecessity of which has been confirmed from media information already recorded in the recording unit, upon detecting that all of the participating users are in a communicatable state. The contents of the above include various kinds of media such as voice, image, video, text, and program data.

When none of the participating users participate in the group, the deleting unit deletes media information from the group from the recording unit. In this case, the deleting unit regards that a user is not participating in the group when the detecting unit detects that this user is in the uncommunicatable state, and also when this uncommunicatable state lasts for a predetermined period of time. The contents server also includes: an extracting unit that extracts media information recorded during a period from when the user is in an uncommunicatable state until the user is once again in a communicatable state, from the recording unit, when the detecting unit detects that the user in an uncommunicatable state enters the communicatable state again; and a transmitting unit that transmits media information extracted by the extracting unit to only the user who has entered the communicatable state again. The detecting unit further detects a temporary uncommunicatable state that a user in the communicatable state can personally set. The temporary uncommunicatable state is processed in the same manner as that of the normal uncommunicatable state.

The contents server further includes: a selecting unit that presents media information extracted by the extracting unit to a user who has entered the communicatable state again to enable the user to select information, and allows the user to transmit only information selected by the user to the transmitting unit; and a web control unit that provides additional services and options to the user. The additional services include a selection of a participating group to the user, a selective transmission of stored media information, or a notification of a communicatable state and an uncommunicatable state. The contents server further includes a participation requesting unit that requests other users in the participating group to participate in the group when the detecting unit detects the participating user. The contents server provides a PoC accumulation service or a teleconference service.

The present invention further provides a contents service system including a communication network, a contents server, a subscriber database, and plural terminals belonging to a predetermined group, wherein the subscriber database manages for each group a subscription state of users of the terminals in the content service, the contents server stores media information in the uncommunicatable state of the terminals for each group. When the terminals are once again in the communicatable state, the contents server transmits the media information recorded during a period from when the terminals are in the uncommunicatable state until the terminals are once again in the communicatable state, to only these terminals, and thereafter deletes the media information.

The contents service system further includes a web server. The web server provides additional services to the contents service, and provides options to the terminals, using a web control function. Additional services include a selection for a participating group, a selective transmission of stored media information, or a notification of a communicatable state and uncommunicatable state.

The contents service system further includes a presence server. The presence server manages the communicatable state and uncommunicatable state of the terminals. The contents server provides the contents service, based on a notification of a change of the communicatable state and uncommunicatable state from the presence server, or response information to an enquiry about the communicatable state and uncommunicatable state made to the presence server.

The presence server detects the communicatable state and uncommunicatable state of each terminal at a predetermined time, and manages these states. Upon detecting a terminal that participates in the group, the contents server notifies the other terminals of the group about participation in the group.

Effect of the Invention

According to the present invention, information to be notified can be temporarily stored in an uncommunicatable state, such as when presence of a group user in the communication area or presence of a user participating in the conference cannot be confirmed. When the user is once again in the communicatable state, such as when the user is present in the communication area or when the user is present in the conference, the user can personally confirm necessity or unnecessity of the information, so that only necessary information can be retransmitted to the user. As a result, information can be securely shared among users participating in the same group using the PoC service or the conference server.

According to the present invention, the stored notification information can be deleted or updated automatically, based on the management state of the communicatable state and uncommunicatable state, such as when each user is in the inner radio area or outer radio area and when each user is present or absent in the conference room. Therefore, expansion of the scale of the storage device in the PoC server or the conference server can be prevented, and service can be provided at a reasonable operation cost while maintaining service quality. The present invention can be also similarly be applied to various kinds of group services in a radio LAN, etc.

As an example, in the case of a teleconference system using an MCU, conference log information during a time zone when a user is not participating or cannot participate in the conference can be provided while maintaining security, by integrating all streaming information containing a large quantity of data images and voice in the MCU, and by linking a conference log function of accumulating conference information to a state of a user participating in the conference.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a view showing one example of a mobile communication system that provides a PoC service.

FIG. **2** is a view showing a first embodiment of the present invention.

FIG. **3**A is a view showing one example of a subscriber management table.

FIG. **3**B is a view showing one example of a group state table.

FIG. **3**C is a view showing one example of a user state table.

FIG. **3**D is a view showing one example of a media log management table.

FIG. **4** is a view showing one example of a group state transition.

FIG. **5** is a view showing one example of a user state transition.

FIG. **6** is a view showing one example of an out-zone detection flow.

FIG. **7**A is a view showing one example (1) of a media log deletion sequence when all participating users are present in the zone.

FIG. **7**B is a view showing one example (2) of a media log deletion sequence when all participating users are present in the zone.

FIG. **8** is a view showing a detailed configuration example of a PoC server **1** shown in FIG. **2**.

FIG. **9** is a view showing one example (1) of a media log deletion control flow shown in FIGS. **7**A and **7**B.

FIG. **10** is a view showing one example (2) of a media log deletion control flow shown in FIGS. **7**A and **7**B.

FIG. **11**A is a view showing one example (1) of a media log deletion sequence when a user in the out-zone is present.

FIG. **11**B is a view showing one example (2) of a media log deletion sequence when a user in the out-zone is present.

FIG. **12** is a view showing one example of a media log deletion control flow shown in FIG. **10**.

FIG. **13** is a view showing a second embodiment of the present invention.

FIG. **14** is a view showing one example of a group participation sequence using a web function.

FIG. **15** is a view showing one example of a terminal display screen when a user joins a group.

FIG. **16** is a view showing one example of a sequence of group participation from the out-zone using a web function.

FIG. **17** is a view showing one example (1) of a display screen of a terminal that moves from the out-zone to the in-zone.

FIG. **18** is a view showing one example (2) of a display screen of a terminal that moves from the out-zone to the in-zone.

FIG. **19** is a view showing a third embodiment of the present invention.

FIG. **20** is a view showing one example of a user state table within a presence server.

FIG. **21** is a view showing one example of a state transition diagram including an absent state.

FIG. **22**A shows one example (1) of a media log deletion sequence when all participating users are present.

FIG. **22**B shows one example (2) of a media log deletion sequence when all participating users are present.

FIG. **23** is a view showing a detailed configuration example of the PoC server **1** shown in FIG. **19**.

FIG. **24**A is a view showing one example (1) of a media log deletion sequence when a participating user is in the out-zone.

FIG. **24**B is a view showing one example (2) of a media log deletion sequence when a participating user is in the out-zone.

FIG. **25**A is a view showing one example (1) of a media deletion sequence when a participating user is absent.

FIG. **25**B is a view showing one example (2) of a media deletion sequence when a participating user is absent.

FIG. **26** is view showing a fourth embodiment of the present invention.

FIG. **27**A is a view showing one example of a group management table.

FIG. **27**B is a view showing one example of a subscriber number correspondence table.

FIG. **28**A is a view showing one example (1) of a sequence for making other users compulsively participate in a group at a user participation time.

FIG. **28**B is a view showing one example (2) of a sequence for making other users compulsively participate in a group at a user participation time.

FIG. **29** is a view showing one example of a terminal display screen at a participation request time.

FIG. **30** is a view schematically showing one example of a teleconference system.

FIG. **31** is a view showing a fifth embodiment of the present invention.

FIG. **32**A is a view showing one example of a conference room state table.

FIG. **32**B is a view showing one example of a user state table.

FIG. **32**C is a view showing one example of a conference log management table.

FIG. **33** is a view showing one example of a conference room state transition.

FIG. **34** is a view showing one example of a user state transition.

FIG. **35** is a view showing one example of a conference participation sequence.

FIG. **36** is a view showing one example (1) of a deletion control flow of a conference log.

FIG. **37** is a view showing one example (2) of a deletion control flow of a conference log.

FIG. **38** is a view showing a processing flow example when an absent user is detected.

FIG. **39** is a view showing a processing flow example when a present user is detected.

BEST MODE FOR CARRYING OUT THE INVENTION

FIG. **2** shows a PoC server and a PoC service system according to a first embodiment of the present invention.

In the present example, the PoC server **1** stores (accumulates) media information when a user is in the out-zone, and reproduces necessary information and provides the user with this information when the user is once again in the in-zone state (the user participates in a group). For this control, the PoC server **1** includes a group state table **101**, a user state table **102**, a media log management table **141**, and a subscriber management table **501** in an external user database (HSS: Home Subscriber Server) **5**. A user dials a group number of a PoC service or a PoC accumulation service in which the user wants to participate, thereby participating in a desired group. In the former PoC service, users participating in the same group use a normal transceiver function to communicate between them. In the latter PoC accumulation service, a user can listen to statements of other participating users accumulated while the user is in the out-zone, when the user is once again in the in-zone state.

In FIG. **2**, PoC-matched terminals A and B within radio areas **3** and **4** (see FIG. **1**) of the IP network built in a radio network establish a communication link with an SIP control unit **11** of the PoC server **1** using an SIP message of the SIP protocol, via an IMS (IP Multimedia Subsystem) **2** corresponding to the provider network shown in FIG. **1**.

An RTP control unit **13** multicasts an RTP packet received from the PoC-matched terminal to another PoC-matched terminal of the same group via an RTP bridge **12**. A media log managing unit **14** temporarily stores media information of the RTP packet received from the PoC-matched terminal into the database, and manages the stored content in the media log management table **141**. The stored media information is suitably deleted or updated by the present invention described later.

The PoC control unit **10** implements the PoC accumulation service of the present invention in coordination with the SIP control unit **11**, the RTP control unit **13**, and the media log managing unit **14**, with an outer control unit **103** using management tables **501**, **101**, **102**, and **141**. The user database (HSS: Home Subscriber Server) **5** establishes a communication link with the PoC server **1** via the IMS **2**, and provides the

PoC server **1** with subscriber user information of the PoC service and accumulation service. The user database **5** can be built into the PoC server **1**.

FIGS. **3**A to **3**D show one example of management tables **501**, **101**, **102**, and **141**. FIGS. **4** to **6** show state transition diagrams or operation flow diagrams concerning the management.

FIG. **3**A shows one example of the subscriber management table **501** of the user database **5**. Subscription states of the PoC service and the PoC accumulation service by registered users A to E are managed in this table. For example, user A in the present example subscribes to both the normal PoC service in which the user can use the PTT function, and the PoC accumulation service in which the user A can reproduce and obtain media content transmitted from other participating users during a period from when the user A is in the out-zone till when the user A returns to the in-zone state again. User A can use the above services by joining a group I or II.

FIG. **3**B shows one example of the group state table **101**. The PoC control unit **10** controls each of the plural PoC groups I to III in two states including an initial state in which no user is participating in the group and a group active state in which at least one user is participating in the group. In the present example, at least one user is participating in group I, and no user is participating in groups II and III.

FIG. **4** shows a transition diagram of a group state.

In the beginning, all users are not participating in a group, and therefore, the group is in the initial state. When at least one user participates in the group, this group changes from the initial state to the group active state. Even when another user participates in the group in the group active state, the group state remains unchanged. When all participating users leave the group or when the group is changed to the initial state, this group returns to the initial state.

FIG. **3**C shows one example of user state table **102**.

User state table **102** records users who subscribe to the PoC accumulation service (see FIG. **3**A) and participate in the group, a state of each user concerning whether or not the user is in the in-zone or in the out-zone after participating in the group, and the time when the presence of each user in the in-zone is confirmed. In the present example, user A is in the initial state, user B is in the in-zone, and user C is in the out-zone. Times when the user B and the user C are last confirmed to be in the in-zone and in the out-zone, respectively are recorded for these users.

FIG. **5** shows a user state transition diagram, and FIG. **6** shows one example of an out-zone detection flow. The out-zone control unit **103** executes this out-zone detection process. The user state transition process and the out-zone detection process are explained below with reference to FIGS. **5** and **6**, using FIG. **3**C as an example.

In the beginning, none of users A to C are participating in the PoC accumulation service. Therefore, in the present example, users A to C registered in the group I are set to the initial state in advance (FIG. **5**). The user state table **102** is also blank in the beginning, and when each user participates in the group, this participating user is added to the table **102** from the out-zone state. Each of users A to C dials the number of group I, and participates in group I. With this arrangement, participating users A to C change to the in-zone state, and group I changes to the group active state (see FIG. **4**).

The out-zone control unit **103** is started when a group changes to the group active state. The out-zone control unit **103** starts the out-zone detection process of detecting a user participating in the group when at least one participating user talks. Therefore, the SIP control unit **11** is controlled to transmit a reINVITE message as the SIP message to each of the PoC-matched terminals A to C of the participating users at a predetermined cycle. Upon receiving the reINVITE message, each PoC-matched terminal returns a 200OK message in response to this message.

When reception of the 200OK message from the PoC-matched terminal B is confirmed within a timeout period, the out-zone control unit **103** maintains the user B in the in-zone state. On the other hand, in the present example, there is no response from PoC-matched terminals A and C. Therefore, the states of users A and C are changed to out-zone at the time of detecting the first timeout (first reINVITE T.O) (S**101** and S**102** in FIG. **6**). Upon confirming that the participating users are in the out-zone, the out-zone control unit **103** informs the group users that the out-zone users (users A and C) are present, using a voice recorded in advance, and starts an out-zone timer (reINVITE message transmission time at a constant number of times after the first reINVITE T.O) to each of users A and C (S**103** and S**104** in FIG. **6**).

In order to once again confirm the in-zone of users A and C, the out-zone control unit **103** periodically transmits the reINVITE message to PoC-matched terminals A and C, within an out-zone timer time (S**105** in FIG. **6**). When PoC-matched terminal C temporarily moves to the out-zone, such as when the terminal is passing a tunnel, for example, the state of user C can be changed to the in-zone state once again (participation in the group) by returning the 200OK message in response to the reINVITE message received after user C has passed the tunnel (S**106** in FIG. **6**).

On the other hand, when user A is in the out-zone state for more than the out-zone timer time, the out-zone timer times out (T.O.), and the state of user A changes to the initial state (FIG. **5**). In this case, the out-zone timer of user A is stopped, and transmission of the reINVITE message to user A is also stopped (S**109** in FIG. **6**). User state table **102** in FIG. **3**C shows a result of detecting the out-zone as one example.

FIG. **3**D shows one example of the media log management table **141**.

The PoC control unit **10** records a group name, transmission source, transmission time, and media data, each time when various media data such as audio data, text data, and image data are transmitted from the PoC-matched terminal. On the other hand, only unnecessary media data is abandoned by the processing described later, and the transmission source and transmission time are stored as log.

In the present example, contents of statements made by users A and B participating in group I are sequentially accumulated in the media log database **14** together with the statement time, as media log information. When notification to the users participating in group I is completed or is no longer unnecessary, data files of these statements are sequentially deleted in a predetermined condition described later. With this arrangement, sharing of information among the members in the same group can be secured. The PoC service can be provided at reasonable service operation cost, while maintaining service quality permissible within a proper storage capacity size of the media log database **14**. A method of deleting the media log information according to the present invention is explained below with reference to detailed examples, based on the above explanation.

FIGS. **7**A and **7**B show one example of a media log deletion sequence when all participating users are in the in-zone. FIG. **8** shows a detailed configuration example of the PoC server **1**, and FIGS. **9** and **10** show one example of a media log deletion control flow. In FIG. **8**, a part of the PoC control unit **10** explained above is shown in detail as a group managing unit, a user managing unit, and a media log managing unit.

In FIGS. **7**A and **7**B, each of users A to C dials group I of the PoC accumulation service. With this arrangement, a PS link is established, and each user is connected to PoC server **1** and participates in desired group I (S**01** and S**02**). In this case, the SIP control unit **11** references the subscriber management table **501** of the user database **5** via a DIAMETER control unit **15**, based on a change instruction of a user state contained in the message when the user participates in the group (at the time of receiving the first INVITE). The DIAMETER control unit **15** accesses the user database (HSS) included in an exchange network **2** (FIG. **7**A) using the DIAMETER protocol.

The SIP control unit **11** carries out a user authentication by referencing the subscription state of a participating user corresponding to a user identifier (SIP-URI) contained in a From header of the INVITE message. A new subscription to the PoC service is registered in a similar process. Upon completing the authentication process, the SIP control unit **11** notifies the user managing unit to update the state (initial state to the in-zone) of the participating user in the user management table **102**. In this case, at least one participating user is present in group I. Therefore, the user managing unit notifies the group managing unit to change the state of group I from the initial state to the group active state. When all users participating in the group leave the group or change to the initial state, the user managing unit notifies the group managing unit. Upon receiving this notice, the group managing unit changes the state of this group from the group active state to the initial state.

In the present example, user C depresses the PTT button of the PoC-matched terminal C to acquire the floor (S**404**). The statement made by user C is converted into a RTR packet inside the PoC-matched terminal C, and the RTP packet is transmitted to PoC server **1**. The RTP control unit **13** transmits the received media information to the media log managing unit. The media log managing unit sequentially stores (accumulates) the media information into the media log database **14** (S**05**), and writes the storage address of user C of the transmission source, group, reception time, and log data file, into the media log management table **141** (see FIG. **3**D). The RTP control unit **13** controls the RTP bridge **12** to multicast the received RTP packet to participating users A and B within the same group. In the present example, user B also repeats a similar process (S**06** and S**07**).

When the media log managing unit notifies the presence of the accumulated media data to the out-zone control unit **103**, the out-zone control unit **103** starts the out-zone detection process (S**08**) explained with reference to FIG. **3**C, FIG. **5**, and FIG. **6**. Specifically, the out-zone control unit **103** instructs the SIP control unit **11** to transmit the reINVITE message of a predetermined cycle to PoC-matched terminals A to C of the participating users. This transmission process of the reINVITE message is repeatedly executed to each PoC-matched terminal of which each user is in a state other than the initial state, until the SIP control unit **11** receives a notification that the state of group I has been changed to the initial state from the group managing unit.

In the present example, SIP control unit **11** confirms the response of the 200OK messages from all of the PoC-matched terminals A to C (S**08**, S**201**), and notifies this to the user managing unit and the out-zone control unit **103**. With this arrangement, the user managing unit maintains the off-zone state of users A to C in the user state table **102**, and updates the confirmation time at the response reception time (final confirmation time) (S**202**).

On the other hand, the out-zone control unit **103** compares the updated content of the user state table **102** and the current content of the media log management table **141**, and executes the following media deletion process. The out-zone control unit **103** compares the oldest confirmation time (in the present example, the confirmation time of user C) among the final confirmation times of the users in the user state table **102** with the time (file writing time) of the media log management table **141**, and requests the media log managing unit to delete (abandon) all media data files written before the oldest confirmation time. In the present example, when the writing time of the media log data is older than the final confirmation time of the user, the media log data is regarded to have been transmitted to all users, if all of the users are in the in-zone. The media log managing unit deletes all media data files at the request of the out-zone control unit **103** (S**203** and S**204**).

Upon receiving the notice from the group managing unit that the state of group I has changed to the initial state, the out-zone control unit **103** regards that it is not necessary to reproduce and transmit media log data which needs to be acquired in real time (S**205**). Out-zone control unit **103** requests the media log managing unit to forcibly delete (abandon) all the media log data held by group I in media log database **14**. The media log managing unit deletes all of the media data files at the request of the out-zone control unit **103** (S**206**). Accordingly, only media data which is required to be notified is stored in the log area of the media log database **14**. Consequently, users in the same group can securely share information, and the PoC accumulation service can be provided in the permissible service quality and at a reasonable service operation cost.

FIGS. **11**A and **11**B show one example of a media log deletion sequence when the out-zone users are present. FIG. **12** shows one example of a deletion control flow of media log information shown in FIGS. **11**A and **11**B. The sequence in which users A to C participate in group I is similar to the process of S**01** to S**03** in FIG. **7**A, and therefore, is not shown in FIG. **11**A.

In the present example, user B first acquires the floor by depressing the PTT button of the PoC-matched terminal B (S**21**). The content of the statement made by user B is converted into the RTP packet inside PoC-matched terminal B, and the RTP packet is transmitted to the PoC server **1**. The RTP control unit **13** transmits the received content of the media information to the media log managing unit. The media log managing unit accumulates the media information into the media log database (S**22**), and writes the storage address of user B of the transmission source, the group, reception time, and log data file, into media log management table **141**. RTP control unit **13** controls the RTP bridge **12** to multicast the received RTP packet to other participating users A and C within the same group. In the present example, PoC-matched terminal A that has moved to the out-zone cannot receive the RTP packet from user B, unlike the examples shown in FIG. **7**A and **7**B.

When the media log managing unit notifies the presence of the accumulated media data to the out-zone control unit **103**, the out-zone control unit **103** starts the out-zone detection process (S**23**). In the present example, the out-zone of user A is detected at S**101** to S**104** of the out-zone detection flow shown in FIG. **6**. The out-zone of user A and its final confirmation time are written into the user state table **102** until the out-zone timer times out. Specifically, when the SIP control unit **11** detects that there is no response to the reINVITE message first transmitted to user A and that this response period times out (initial reINVITE T.O), the SIP control unit **11** starts the out-zone timer, and notifies this effect to the user managing unit and out-zone control unit **103**.

The user managing unit changes the user state to the out-zone state, based on notification from the SIP control unit **11**. When the out-zone control unit **103** recognizes the first reINVITE timeout of the participating user based on the notification from SIP control unit **11**, out-zone control unit **103** responds to the "audio data to be reproduced when a user participating in the PoC group becomes in the out-zone state" recorded beforehand in out-zone audio unit **16** to the participating user via RTP bridge **12** by the control of RTP control unit **13**. When an out-zone user is present, the deletion sequence of the media log information based on the in-zone confirmation of all users A to C shown in FIGS. **9** and **10** is not executed (S**24**).

In the present example, user C in the in-zone depresses the PTT button of the PoC-matched terminal C to acquire the floor (S**25**). The content of the statement made by user C is accumulated in the media log database **14** (S**26**). User A in the out-zone cannot obtain the content of the statement made by user C either.

When user A moves to the out-zone before the out-zone timer times out, PoC-matched terminal A receives the reINVITE message transmitted in a predetermined cycle from SIP control unit **11** even while user A is in the out-zone, and responds in the 200OK message (S**27**). SIP control unit **11** detects the out-zone of user A (reINVITE response confirmation after the first reINVITE T.O), and notifies this effect to the user state managing unit and the out-zone control unit **103**. The out-zone control unit **103** receives the notification from the SIP control unit **11** (S**301**), and executes re in-zone subscriber detection process shown in FIG. **12**. The user managing unit updates the state of user A to the in-zone based on the notification from the SIP control unit **11**, after extracted data described later notified from the out-zone control unit **103** is transmitted (S**305**).

The out-zone control unit **103** obtains the final confirmation time of the out-zone moving of user A from the user state table **102** before updating (S**302**). The out-zone control unit **103** compares the final confirmation time with the writing time of the media log in the media log management table **141**, and extracts media log data accumulated after the final confirmation time of user A (S**303**). The extracted media log data is the accumulation of the content of the statement made by either one or both users B and C while user A is in the out-zone. Therefore, the out-zone control unit **103** requests the media log managing unit to transmit the extracted data to user A. The media log managing unit transmits the transmission-requested data to the RTP control unit **13**. The RTP bridge **12** transmits this data to only user A (S**28** and S**304**).

Thereafter, the user managing unit updates the user state table **102** to the in-zone of user A and to the final confirmation time immediately before this detection (S**305**). The content of the subsequent process (S**306** and S**307**) is similar to that of S**203** and S**204** in FIG. **8** conditioning the confirmation of the in-zone of users A to C. Therefore, all media data files before the oldest confirmation time are deleted, including the content of the statements made by one or both users B and C accumulated while user A is in the in-zone (S**29**). As a result, even when a user in the out-zone is present, information can be securely shared among the users in the same group. Further, the PoC service can be provided in the permissible service quality and at reasonable service operation cost.

FIG. **13** shows a PoC server and a PoC service system using the same according to a second embodiment of the present invention.

In the present embodiment, a web control unit **17** is added to the configuration of the PoC server **1** shown in FIG. **2**. The web control unit **15** is realized by the known HTTP (Hyper Text Transfer Protocol) server function, and therefore, a browser function is required at the PoC-matched terminals A to C. When this web control function is introduced, a user can easily participate in the PoC accumulation service using a GUI (Graphical User Interface). When user A shown in FIGS. **11**B and **12** returns from the out-zone state to the in-zone state, plural options of media log data reproduction methods while the user is in the out-zone can be displayed in the browser. Accordingly, quality of the PoC service can be improved in addition to the improvement in the operability of the PoC service on the user side.

FIG. **14** shows one example of a group participation sequence using the web function. FIG. **15** shows one example of a display screen of the PoC-matched terminal displayed when a user participates in the group of the PoC service.

In FIG. **14**, user A is explained as an example. After establishing the PS link (see S**01** in FIG. **7**A), the user accesses the web control unit **17** of the PoC server **1** from the PoC-matched terminal A using the HTTP protocol. Accordingly, the PoC control unit **10** notifies information of a list of groups in which user A can participate, to the web control unit **17**, by referencing the group state table **101** etc. The web control unit **17** converts this information into HTML data such as the C-HTML (Compact-Hyper Text Markup Language), and transmits this information to the PoC-matched terminal A. The PoC-matched terminal A displays the list of groups in which user A can participate, in the display, using the browser function.

In the example shown in FIG. **14**, the list of groups in which user A can participate by the web operation in the initial state is displayed in the PoC-matched terminal A. For example, when user A selects the group I from this list and clicks "determine", the PoC service is started via a CGI (Common Gateway Interface) and the serve let function provided at the PoC server I side. The user can also automatically dial the number of group I using the PHONE TO function of the C-HTML, thereby starting the PoC/PoC accumulation service. The icon at the right upper side on the screen displays reception strength of a radio at the PoC-matched terminal A. Accordingly, user A can participate in the PoC group by selecting the desired group I. This process is similar to that in the first embodiment, and is carried out using the SIP protocol between the PoC-matched terminal A and the SIP control unit **11** (see S**02** in FIG. **7**A).

FIG. **16** shows one example of a group participation sequence from the out-zone using the web function. FIGS. **17** and **18** show one example of a screen displayed in the PoC-matched terminal of the user, when the participating user moves from the out-zone to the in-zone.

In FIG. **16**, the PoC-matched terminal A participating in the group again from the out-zone receives the reINVITE message from the PoC server **1**, and replies with a 200OK message (S**31**). Accordingly, the out-zone control unit **103** within the PoC control unit **10** detects the in-zone state again of out-zone user A.

The out-zone control unit **103** requests the media log managing unit to confirm the accumulated media log, and notifies the presence or absence of a log to the web control unit **17** based on a confirmation result from the media log managing unit. The web control unit **17** converts the notified content to HTML data, and transmits the HTML data to the PoC-matched terminal A. The PoC-matched terminal A displays the notification content of presence or absence in the display, using the browser function.

FIG. **17** shows one example of a display screen when there is a statement from other participating users while user A is in the out-zone. FIG. **18** shows one example of a display screen

when there are statements from plural participating users while user A is in the out-zone. In the case of FIG. **18**, user A has an option of obtaining the content of the statements made by the other participating users. User A clicks "obtain" by selecting a statement number when user A wants to obtain the statement content. On the other hand, when user A does not want to obtain the statement content, user A selects this statement number and clicks "erase".

Referring to FIG. **16** again, the selection instruction content is notified to the web control unit **15** in the HTTP protocol. The media log managing unit of the PoC control unit **10** reproduces media data to be obtained, following the instructions, and transmits the reproduced media data to the RTP control unit **13**. The RTP control unit **13** controls the RTP bridge **12** to transmit the media data to only the PoC-matched terminal A. On the other hand, the media log managing unit deletes the media data that is not required to be obtained, from the media log database **14**. When the web function is used in this way, the user can use various options. Therefore, a detailed PoC service having high quality can be provided.

FIG. **19** shows a PoC server and a PoC service system using the same according to a third embodiment of the present invention.

In the present example, a presence server **7** is added to the configuration of the PoC server **1** shown in FIG. **2**, and a presence server coordinating unit **18** is added to the inside of the PoC server **1**. Group state table **101** and user state table **102** in PoC control unit **10** shown in FIG. **2** are transferred to the inside of the presence server **7** as a group state table **701** and a user state table **702**.

According to the present example, the presence server **7** is prepared separately from the PoC server **1**. The presence server **7** carries out batch management of the group state and user state, thereby confirming the absence or presence of participating users. The presence server **7** notifies the current user state or its state change to the PoC server **1** autonomously or at the enquiry from the PoC server **1**. Based on the coordination between the PoC server **1** and the presence server **7**, proper dispersion of functions and proper dispersion of load can be achieved in the provision of the PoC service. Accordingly, the PoC server **1** can be devoted to the original PoC service and the PoC accumulation service, thereby providing high-quality service even when the number of participating users increases.

FIG. **20** shows one example of the user state table **702** provided in the presence server **7**. An "absent" state is added to the user state table **702**, as compared to the user state table **102** shown in FIG. **3**C. FIG. **21** shows a state change diagram containing the absent state. As shown in FIG. **21**, the presence server **7** manages the user state (presence) in four states including: a state in which a user is not participating in the group, i.e., an "initial" state (offline); a state in which a user is participating in the group, i.e., a "present" state (online); a state in which a user is participating in the group, but is outside the radio area, i.e., an "out-zone" state; and a state in which a user is participating in the group, but cannot listen to the conversation, i.e., an "absent" state. The presence server **7** confirms the in-zone of these user states.

The difference between the state change in the present example and the state change shown in FIG. **5** explained above is explained. First, changes of the initial state, in-zone state, and out-zone state are the same as those shown in FIG. **5**. In the present example, in order to decrease the load of the PoC server **1**, the presence server **7** can periodically carry out confirmation of the in-zone of all users (health check), thereby notifying out-zone detection to the PoC server **1**. In the present example, each user can freely change the presence at the user's will, if the user is in the in-zone state. For example, when there is a situation in that a user cannot listen to the statements made by other participating users, the user can change its own state to an absent state, and return the state to the in-zone state thereafter.

When a user's state changes from the absent state to the in-zone state, the user can then obtain the content of statements made by other users during the absent period, in a similar manner to when the user participates in the group from the out-zone. When the user changes the user's presence (absence or presence), the user in the in-zone personally notifies this change to the presence server **7** via the PoC server **1**. When a user changes from the absent state to the out-zone state or the initial state, this change is executed in a process similar to that applied to a change from the in-zone state to the out-zone state or the initial state (see FIG. **6**).

FIG. **22**A and FIG. **22**B show one example of a media log deletion sequence when all participating users are present. FIG. **23** shows a more detailed configuration example than that of the PoC server **1** in the present example. Detailed operations carried out between the blocks shown in FIG. **23** are similar to those explained above with reference to FIG. **8**, except the operations of the presence server **7** and presence server coordinating unit **18**.

In FIG. **22**A, the process from when users A to C establish a PS link with the packet exchange network **2** until users A to C participate in the PoC group (S**41** and S**42**) is similar to that when there is no presence server (S**01** and S**02** in FIG. **7**A). However, in the present example, a request for changing the presence (in-zone) from a participating user is sent from the PoC server **1** to the presence server **7** via the presence server coordinating unit **18** (S**43**). The presence server coordinating unit **18** uses a SIMPLE (SIP for Instant Messaging Presence Leveraging Extensions) protocol, to coordinate with the PoC service **1**. The presence server **7** manages the in-zone and out-zone state of a user, using group state table **701** and user state table **702**.

In the present example, user C obtains the floor by depressing the PTT button of the PoC-matched terminal C (S**44**). The content of statement made by user C is converted into a RTP packed inside the PoC-matched terminal C, and the RTP packet is transmitted to the PoC server **1**. The RTP control unit **13** transmits the received media information to the media log managing unit. The media log managing unit accumulates the media information into the media log database **14**. The RTP control unit **13** also multicasts the received RTP packet to participating users A and B within the same group, via the bridge **12**.

In the present example, the presence server **7** updates the user state table **702** by periodically confirming the in-zone of users (FIG. **19**). Specifically, the presence server **7** requests the SIP control unit **11** to transmit the reINVITE message via the presence server coordinating unit **18**. Upon receiving this transmission request, the SIP control unit **11** periodically transmits the reINVITE message to each participating user, and notifies a response confirmation content to the presence server **7** via the coordinating unit **18**. As an alternative method of confirming the user in-zone state, the presence server **7** can confirm the in-zone of a user by periodically transmitting a PING command to each user terminal. In this case, the presence server **7** by itself can confirm the user in-zone state, thereby further decreasing the load of the PoC server **1**.

Upon being notified of the presence of accumulated media data from the media log managing unit, the out-zone control unit **103** periodically polls the presence server **7** about the user state via the presence server coordinating unit (S**47**). The out-zone control unit **103** does not control the SIP control unit

11 in this case. When all users are in the in-zone state as a result of the enquiry, the out-zone control unit **103** requests the media log managing unit to delete the corresponding media log. The media log managing unit deletes the requested media log (S**48**). As in the first embodiment (FIGS. **7**A to **10**), all log data files of all users who are in the in-zone state before the oldest confirmation time are deleted from the media log database **14**. When all users are in the initial state, all the log data files are forcibly deleted.

FIGS. **24**A and **24**B show one example of a media log deletion sequence when a participating user is in the out-zone state. The process until when users A to C participate in group I is similar to that at S**41** to S**43** shown in FIG. **22**A, and, therefore, is not shown in FIG. **24**A. Detailed operations carried out between the blocks shown in FIG. **23** are similar to those explained above with reference to FIG. **8**, except the operations of the presence server **7** and the presence server coordinating unit **18**.

In the present example, the process starts from the following operation. During the confirmation of the in-zone state of users led by the presence server, when the first re-INVITE which the SIP control unit **11** transmits to user A times out, the SIP control unit **11** notifies this effect to the presence server **7** via the presence server coordinating unit **18** (S**51**). In this case, the presence server **7** sets user A in the user state table **701** to the out-zone state, and instructs the out-zone control unit **103** to confirm that user A is in the in-zone state again, via the presence server coordinating unit **18**. Upon receiving this instruction, the out-zone control unit **103** makes the SIP control unit **11** start confirmation processing of the re-in-zone state (S**52**). In the present example, user B makes a statement during the confirmation of the re-in-zone state, and the PoC server **1** accumulates the content of this statement (S**53** and S**54**).

Accordingly, the out-zone control unit **103** receives a notification of the presence of accumulated media data from the media log managing unit, and periodically polls the presence server **7** about the user state via the presence server coordinating unit **18**. Because user A is in the out-zone state, the out-zone control unit **103** does not request the media log managing unit to delete the media log (S**55** and S**56**).

Upon receiving the 200OK message from user A who has moved to the in-zone before the out-zone timer times out, the SIP control unit **11** notifies this effect to the presence server **7** via the presence server coordinating unit **18**. The presence server **7** receives this notification, updates user A in the user state table, and notifies the re-in-zone state of user A to the out-zone control unit **103** via the presence server coordinating unit **18** (S**57**). When the user moves from the out-zone state to the in-zone state, or when the user shown in FIGS. **25**A and **25**B changes from the absent state to the in-zone state (including the present state), the presence server **7** notifies the in-zone state of the user and the final confirmation time necessary for the process during the re-n-zone state shown in FIG. **12**, to the out-zone control unit **103**.

The out-zone control unit **103** extracts a media log during a period from the final confirmation time of the out-zone detection time of user A until the current time, based on the time of the media log in the media log management table **141**. The out-zone control unit **103** instructs the media log managing unit to reproduce the extracted media log data. The media log managing unit transmits the reproduced data to the RTP control unit **13**. The RTP control unit **13** transmits the reproduced data to only user A via the RTP bridge **12**. The media log managing unit deletes the transmitted media log data from the media log database **14** (S**58** and S**59**)

Regarding the transmission of the reproduced data, user A can select only media data which user A wants to receive, using the web function according to the second embodiment in combination. In the present example, the PoC server **1** executes the re-in-zone detection processing. When the presence server **7** has a function of periodically transmitting a PING command to each user terminal or an out-zone timer, the presence server **7** by itself can execute the re-in-zone detection process. Accordingly, load on the PoC server **1** can be decreased.

FIGS. **25**A and **25**B show one example of a media log deletion sequence when a participating user is absent or present. In the present example, the sequence operation until when users A to C participate in group I is similar to that shown at S**41** to S**43** in FIG. **22**A. Detailed operations between the blocks shown in FIG. **23** are similar to those explained with reference to FIG. **8**, except the operations of the presence server **7** and the presence server coordinating unit **18**.

In the present example, when present user A depresses an absence button provided at the PoC-matched terminal A or clicks an absence button displayed on the terminal screen, a change of the state of user A (absence) is notified to the presence server **7** via the PoC server **1** (S**61**). Accordingly, the presence server **7** sets user A in the user state table **702** to the absence. There is no particular prescription regarding a change (absence or presence) of presence, and a change of a parameter contained in the SIP message can be used, for example. In the present example, user B makes a statement thereafter, and the content of the statement is accumulated in the media log database **14** (S**62** to S**63**). In this case, absent user A cannot receive an RTP packet transmitted from the PoC server **1**.

The out-zone control unit **103** of the PoC server **1** is started based on the presence of a media data file, and request the presence server **7** to confirm the user state via the presence server coordinating unit **18**. In the present example, the presence server **7** notifies the absence of user A (S**64**). The state of absence is processed in a similar manner to that of the state of out-zone. Therefore, the media log data file accumulated in the media log database **14** is not deleted (S**65**). This is because the state of absence can be regarded to be the same as the state of out-zone in that the media information cannot be notified to all users.

Accordingly, when user A depresses a presence button provided at the PoC-matched terminal A or clicks a presence button displayed on the terminal screen, a change of the state of user A (presence) is notified to the presence server **7** via the PoC server **1**. The presence server **7** sets user A in the user state table **702** to the presence, and notifies this effect and a confirmation time of this setting to the out-zone control unit **103** of the PoC server **1** via the presence server coordinating unit **18** (S**65**). The out-zone control unit **103** executes the same process as the re-in-zone process (see FIG. **12**) (S**66** and S**67**).

Although not shown in the drawing, while user A is absent, the in-zone confirmation process (periodical transmission of the reINVITE message) is carried out in a similar manner to that when user A is in the out-zone state. When a response to the first reINVITE message times out, the state of user A changes to the out-zone state (see FIG. **21**). In the present example, the user can freely obtain the content of statements made by other participating users.

FIG. **26** shows a detailed configuration example of the PoC server **1**, according to a fourth embodiment of the present invention. FIGS. **27**A and **27**B show an example of a group management table and a subscriber number correspondence

table, respectively. According to the embodiments explained above, when a user first participates in the PoC service (group), the user needs to wait until another user autonomously participates in the same group. In order to avoid this situation, in the present example, when a specific user participates in the PoC group, other users of the same group are requested to participate in this group.

The configuration shown in FIG. **26** is different from that shown in FIG. **8** in that a user participation control unit **19** and a PDP (Packet Data Protocol) control unit **20** are added to the PoC server **1** shown in FIG. **26**, and that only a group management table **502** and a subscriber number correspondence table **503** are added to the user database **5** shown in FIG. **26**. Other configurations are similar to those explained with reference to FIG. **8**, and therefore, are not explained hereafter.

In FIG. **26**, the PDP control unit **20** carries out communication control using the PDP protocol, with a GGSN (Gateway GPRS Support Node, GPRS: General Packet Radio Service) etc., within a core network including the PS (Packet Switch). In the present example, the PDP control unit **20** requests the GGSN to transmit a packet to a predetermined user in a PDP message. The GGSN receives this request, and requests the PS and others to establish a packet data transfer link between the core network **2** and the user.

When the group managing unit coordinating with the user managing unit notifies the user participation control unit **19** concerning detection of a participating user and a group in which the user participates, the user participation control unit **19** accesses the user database **5** via the DIAMETER control unit **15**, and obtains necessary data from the group management table **502** and the subscriber number correspondence table **503** in the user database **5**. In this example, the user participation control unit **19** obtains information about whether the group has a user compulsory participation function from the group management table **502**. When the group has a user compulsory participation function, the user participation control unit **19** obtains a terminal user identifier IMUI (International Mobile User Identity) that uniquely specifies other users in the same group from the subscriber number correspondence table **503**. Accordingly, the user participation control unit **19** notifies a request for transmitting a packet to the user, to the PDP control unit **20**.

FIG. **27**A shows one example of the group management table **502**. In the present example, only group I has the compulsory participation function. When any one user of group I participates in this group, other users of the same group are requested to participate in the group. FIG. **27**B shows one example of the subscriber number correspondence table **503**. In the present example, a call-arrival user is specified using the terminal user identifier IMUI. Alternatively, the telephone number of the call-arrival user can be also used. While the compulsory participation function is given to each group in the present example, this can be given to each specific user. In this case, only when a specific user (a group leader or the like) of group I participates in the group, other users in the same group can be requested to participate in the group.

FIGS. **28**A and **28**B show one example of a sequence of making users B and C compulsively participate in the group when user A participates in the PoC group. FIG. **29** shows one example of a display screen of the PoC-matched terminals B and C of which users are requested to participate in the group. In the present example, group I has a compulsory participation function, and users A, B, and C can participate in group I.

In FIG. **28**A, only user A first establishes a PS link with the packet exchange network **2**, and participates in the PoC group I (S**71** and S**72**). Upon receiving a notification from the group managing unit that user A has participated in the group I, the user participation control unit **19** of the PoC server **1** accesses the user database via the DIAMETER control unit **15**, and obtains information that group I has the compulsory participation function from the group managing unit **502** (FIG. **27**A), and the information of the terminal user identifier IMUI (FIG. **27***b*) information of users B and C in the same group from the subscriber number management table **503**. Accordingly, the user participation control unit **19** instructs the PDP control unit **20** a request for a packet arrival to B and C (S**73**).

Upon receiving this instruction, the PDP control unit **20** transmits the GGSN of the core network **2** a request message of a packet arrival (PDP PDU (Protocol Data Unit) message) to users B and C (S**74**). As shown in the drawing, information elements of the PDP PDU message include a service type (PoC call arrival), the IMUI, the IP address and the port number of the PoC server **1**, and the participation group ID (group I). The PS in the core network **2** establishes a packet data transfer PDP Context to users B and C at the request of the GGSN (S**75**). In this case, data content of the information elements of the PDP PDU message is notified to PoC-matched terminals B and C.

Upon receiving this notification, PoC-matched terminals B and C starts an APL (Application Program Loader), and displays a browser screen shown in FIG. **29**. The B and C choose either a "participate" button or a "leave" button to participate in or leave the group I, and click the selected button. FIG. **29** shows an example in that both users B and C participate in group I. Users B and C participate in group I in a process similar to that explained with reference to FIGS. **14** and **15** (S**76** and S**77**). As explained above, according to the present example, participation in the group can be automatically requested to other users without waiting for autonomous participation of the other users. Therefore, important information can be easily transmitted to a group conference or group members, and the PoC service based one-to-one audio communication can be carried out more effectively.

FIG. **3** graphically shows one example of a general teleconference system.

The present example shows a multi-point bidirectional teleconference system provided by a telecommunication business provider on the IP network, such as a virtual conference room in which a small number of users carry out a simple meeting, using, personal computers (hereinafter, "PCs").

In FIG. **30**, teleconference client terminals (PC terminals) D, E, and F access a virtual conference room in which a telecommunication business provider provides in a teleconference server **8** within a network. In the teleconference server **8**, teleconference server software continuously operates, and the teleconference server **8** connects the client terminals (PC terminal) D, E, and F in a star arrangement, using an MCU (Multi-point Conference Unit) within the server. Based on this configuration, efficiency of using the communication line increases, and consolidated management of the conference room is achieved.

On the other hand, client terminals D, E, and F start each teleconference client software, and access the teleconference server **8**. A communication link is established between the teleconference server **8** and each client terminals D, E, and F, using the SIP protocol. In this teleconference system, the content of the conference is streamingly delivered to each participant of the conference in real time through the MCU on the teleconference server **8**.

FIG. **31** shows a fifth embodiment of the present invention.

The present example is the application of the above mechanism of various kinds of PoC service system according to the present invention, to the teleconference system. In the present

example, the configuration of the PoC service system is similar to that of the third embodiment. The teleconference server **8** coordinates with the presence server **7** via a presence server coordinating unit **86**. The presence server **7** collectively manages a conference room state table **703** and a user state table **704**.

The presence server **7** notifies the current user state or its state change to the teleconference server **8** autonomously or at an enquiry from the teleconference server **8**. Based on coordination between the teleconference server **8** and the presence server **7**, proper dispersion of functions and proper dispersion of load can be achieved in the provision of the teleconference service. Accordingly, the teleconference server **8** can be devoted to the original service, thereby providing high-quality service even when the number of participating users increases.

In the present configuration, as described above, client terminals (PC terminals) D, E, and F are combined in a star arrangement, efficiency of using the communication line is increased, and consolidated management of the conference room is achieved, using an MCU **85**. The MCU **85** includes an RTP control unit. An absence control unit **891** of the teleconference control unit **80** accumulates information upon recognizing a user leaving the room (absence), and reproduces the accumulated information according to when the user participates in the conference again.

When a web function **82** is used, a use who wants to participate in the conference can assign participation in the conference at the web portal site. A user who participates in the conference can make a statement or listen to statements of other participants. The IP network **9** in the present example is not limited to radio networks **3** and **4** for the PoC service, and can be fixedly connected by a radio network. In the present example, the IP network **9** according to the radio fixed connection is used. Other configurations are similar to that shown in FIG. **19**.

FIG. **32**A to **32**C show one example of a statement table and a log management table used in the present embodiment.

The conference room state table **703** provided within the presence server **7** is processed in a similar manner to that of the group state table **101** (FIG. **3**B) of the PoC service (see FIG. **33** described later). The user state table **704** does not have a state of "out-zone", unlike the user state table (FIG. **20**) used in the embodiment of the PoC service using the presence server **7**, because the IP network **9** according to the radio fixed connection is used (see FIG. **34** described later).

A reference log management table **83** provided in the teleconference server **7** is processed in a similar manner to that of the media log management table **141** (FIG. **3**D) of the PoC service (see FIGS. **36** to **39** described later). In the present example, participation of an unspecified person in the conference is also assumed. Therefore, the subscriber management table **501** (FIG. **3**A) of the PoC service is not specifically provided. Participants in the conference are managed using a user database **64**.

FIG. **33** shows a transition of a conference room state, and corresponds to FIG. **4** of the PoC service.

In this case, the process is carried out in a similar manner to that of the PoC service. In the beginning, none of the users are participating in the service, and therefore, the state of the conference room is in the initial state. When at least one person participates in the conference room, the state of the conference room changes from the initial state to the active state. While the conference room is in the active state, participation of another user in the conference room does not change the state of the conference room. When all participating users leave the conference room or change to the initial state, the conference room returns to the initial state.

FIG. **34** shows a transition of a user state including an absence state, and corresponds to FIG. **21** of the PoC service.

In FIG. **34**, the presence server **7** manages the user state (presence) in the following four states including: a state in which a user is not participating (absent) in the conference room, i.e., an "initial" state (offline); a state in which a user is participating in the conference, i.e., a "present" state (online); a state in which a user is participating in the conference room, but is on the outside of the conference room based on a user's own decision, i.e., an "absent-1" state; and a state in which a user is participating in the conference room, but cannot listen to the statements in the conference, i.e., an "absent-2" state. The presence server **7** confirms the presence in these user states, in the present example.

The "absent-1" state refers to a case in which the user personally instructs "absent" to the web portal site using the web function **82**. The state enters "absent" immediately after this instruction is notified to the absence control unit **801**. On the other hand, the "absent-2" state refers to a case in which the user is participating in the conference, but the presence server **7** detects that the user is "absent" due to trouble in the line of the IP network **9** or congestion. Because the absence process is executed in both the "absent-1" state and the "absent-2" state, both states are managed as one "absent" state in the user state table **704**. Detailed conditions of the state change are similar to those shown in FIG. **21**.

FIG. **35** shows one example of a conference participation procedure.

A user in the present example is fixedly connected to the IP network **9**, and therefore, the INVITE message is transmitted to the teleconference server **8** when the user participates in the conference (S**81**). In this case, the web browser can be used in the procedure as shown in FIGS. **14** and **15** of the PoC service.

A detailed flow of the processing sequence after the user participates in the conference is the same as that shown in FIGS. **7**A and **7**B (when all the users are present in the present example), FIGS. **11**A and **11**B (when there is an absent user in the present example), and FIG. **16** (when the user is present again in the present example), in the PoC service. Details of the above operations are as explained with reference to the drawings above, and only the outline operation of the teleconference service is briefly explained below.

Detection of absence of a user and recording during the absence of a user are carried out as follows: (1) the teleconference server **8** records the conference (streaming information including both audio and video information) when all the scheduled participants in the conference are not present at the beginning of the conference; (2) when there are responses from all participants in the conference, accumulated information is deleted; and (3) the television conference server **8** records the time when the user is absent.

Reproduction control during detection of presence of a user is carried out as follows: (1) when a user temporarily absent returns and participates in the conference once again, the teleconference server **8** enquires whether the information during the absence of the user is to be reproduced; (2) when the information during the absence of the user is necessary, necessary information is transmitted again to only this user; and (3) when the information during the absence of the user is necessary and also when there is no user who requires accumulation of the information, the information is abandoned. The above operations are basically unchanged from those of the PoC service.

A representative processing flow of the teleconference service according to the present invention is briefly explained

below. This processing flow is also similar to that of the PoC service. Detailed operations are as explained above for the PoC service with reference to the drawings.

FIGS. **36** and **37** show one example of a deletion control flow of a basic conference log, and correspond to FIGS. **9** and **10** for the PoC service. In FIG. **36**, log data of the conference are sequentially deleted when presence of all users is confirmed. Specifically, the absence control unit **801** is started when the conference room changes to the active state. When at least one participating user makes a statement, absence detection process of the group participation member is started.

Thereafter, the SIP control unit **81** is controlled to transmit the reINVITE message as the SIP message to each of the participating user terminals D to F at a predetermined cycle. Upon receiving the reINVITE message, each terminal returns the 200OK message in response. When the presence of all users is confirmed after receiving the reINVITE message from the participating users (S**801**), final confirmation times of the users recorded in the user state table **704** are compared with each other, and all conference logs **83** recorded before the oldest confirmation time are deleted (S**802** and S**803**).

In FIG. **37**, when the conference state changes to the initial state during presence of the conference log data, all conference log data held by the group are deleted, to effectively use the log area (S**811** and S**812**).

FIGS. **38** and **39** show an example of a processing flow when an absent user and a returning user are detected, and these drawings correspond to FIGS. **6** and **12** for the PC service.

In the present example, when absence of at least one participating user is detected, the conference log is not deleted. After the absent user is detected, data files in the conference log are not deleted, but temporarily stored. After the absent user enters the conference room again, data files necessary in the conference log are deleted (see FIG. **39**).

Specifically, when a first timeout is detected due to no response from a certain terminal (first reINVITE T.O), the absence control unit **801** changes the state of the user of the terminal to absent ("absent-2" in FIG. **34**) (S**821** to S**823**). The absence control unit **801** reports this effect to participating users other than the absent user, and starts the absence timer (a reINVITE message transmission time of a constant number of times after the first reINVITE T.) to the absent user (S**824**).

The absence control unit **801** thereafter periodically transmits the re-INVITE message to the absent user within an absence timer time, thereby detecting the returning user (S**825**). When the user is temporarily absent within the absence timer time (when temporary congestion occurs), the absent user is changed to the present state again (S**827**). After the timeout, the absent user is changed to the initial state (absent). In this case, the absence timer of the absent user is stopped, and transmission of the reINVITE message to the absent user is also stopped.

In FIG. **39**, upon detecting the returning user (S**831**), the absence control unit **801** obtains the final confirmation time of the absence from the user state table **704** before updating (S**832**), compares this time with the time of writing to the conference log management table **83**, and extracts the conference log data accumulated after the final confirmation time of the absent user (S**833**). The absence control unit **801** requests the conference log managing unit to transmit the extracted data. The RTP control unit **85** transmits the transmission-requested data to only the absent user (S**834**).

Thereafter, in the user state table **704**, the absent user is updated to "present", and confirmation time is updated to the final confirmation time nearest to the detection of the absence (S**835**). The subsequent processing contents (S**836** and S**837**) are similar to those of S**803** and S**804** shown in FIG. **36** conditional to the confirmation of the in-zone of all users. As a result, all media data files before the oldest confirmation time are deleted including the contents of statements made by other users accumulated during the absence of the users.

What is claimed is:

1. A contents server including a processor to execute processes containing:

recording media information transmitted from a plurality of users in a communicatable state, in which a user is able to communicate, participating in a predetermined group, for each group;

detecting a communicatable state or an uncommunicatable state, in which a user is not able to communicate, of each participating user, at each predetermined time; and

deleting, upon detecting that all the participating users are in the communicatable state, media information from media information already recorded in the recording process, by cooperating with a comparing process which compares an oldest confirmation time among final confirmation times of the users in a user state table with a file writing time in a media data file and requests the deleting process to delete all media data files written before the oldest confirmation time;

extracting media information recorded during a period from when the user is in the uncommunicatable state, till when the user is in the communicatable state again, from the recording process, when the detecting process detects that the user in the uncommunicatable state enters the communicatable state again;

transmitting media information extracted by the extracting process to only the user who has entered the communicatable state again; and

presenting media information extracted by the extracting process to a user who has entered the communicatable state again to enable the user to select information, and making the user transmit only information selected by the user to the transmitting process.

2. The contents server according to claim **1**, wherein

the deleting deletes media information from the group from the recording, when none of the participating users participate in the group.

3. The contents server according to claim **2**, wherein

the deleting regards that a user is not participating in the group when the detecting detects that this user is in the uncommunicatable state, in which a user is not able to communicate, and also when this uncommunicatable state lasts for a predetermined period of time.

4. The contents server according to claim **1**, wherein

the detecting further detects a temporary uncommunicatable state, in which a user is not able to communicate, that a user in the communicatable state, in which a user is able to communicate, can personally set, and the temporary uncommunicatable state is processed in the same manner as that of the uncommunicatable state.

5. The contents server according to claim **1**, further comprising a web control unit that provides additional services and options to the user.

6. The contents server according to claim **5**, wherein

additional services includes a selection of a participating group to the user, a selective transmission of stored media information, or a notification of a communicatable state, in which a user is able to communicate, and an uncommunicatable state, in which a user is not able to communicate.

7. The contents server according to claim **1**, further comprising

requesting a participation of another user in the participating group when the detecting detects the participating user.

8. The contents server according to claim **1**, wherein

the contents server provides a PoC accumulation service or a teleconference service.

* * * * *