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CA 2493742 A1 2004/02/05

(21) 2 493 742

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2003/07/22
(87) Date publication PCT/PCT Publication Date: 2004/02/05
(85) Entrée phase nationale/National Entry: 2005/01/26
(86) N° demande PCT/PCT Application No.: US 2003/022728
(87) N° publication PCT/PCT Publication No.: 2004/012374
(30) Priorités/Priorities: 2002/07/31 (60/399,787) US;
2002/12/13 (10/319,180) US

(51) Cl.Int.^{7}/Int.Cl.^{7} H04Q 7/20, H04B 1/38

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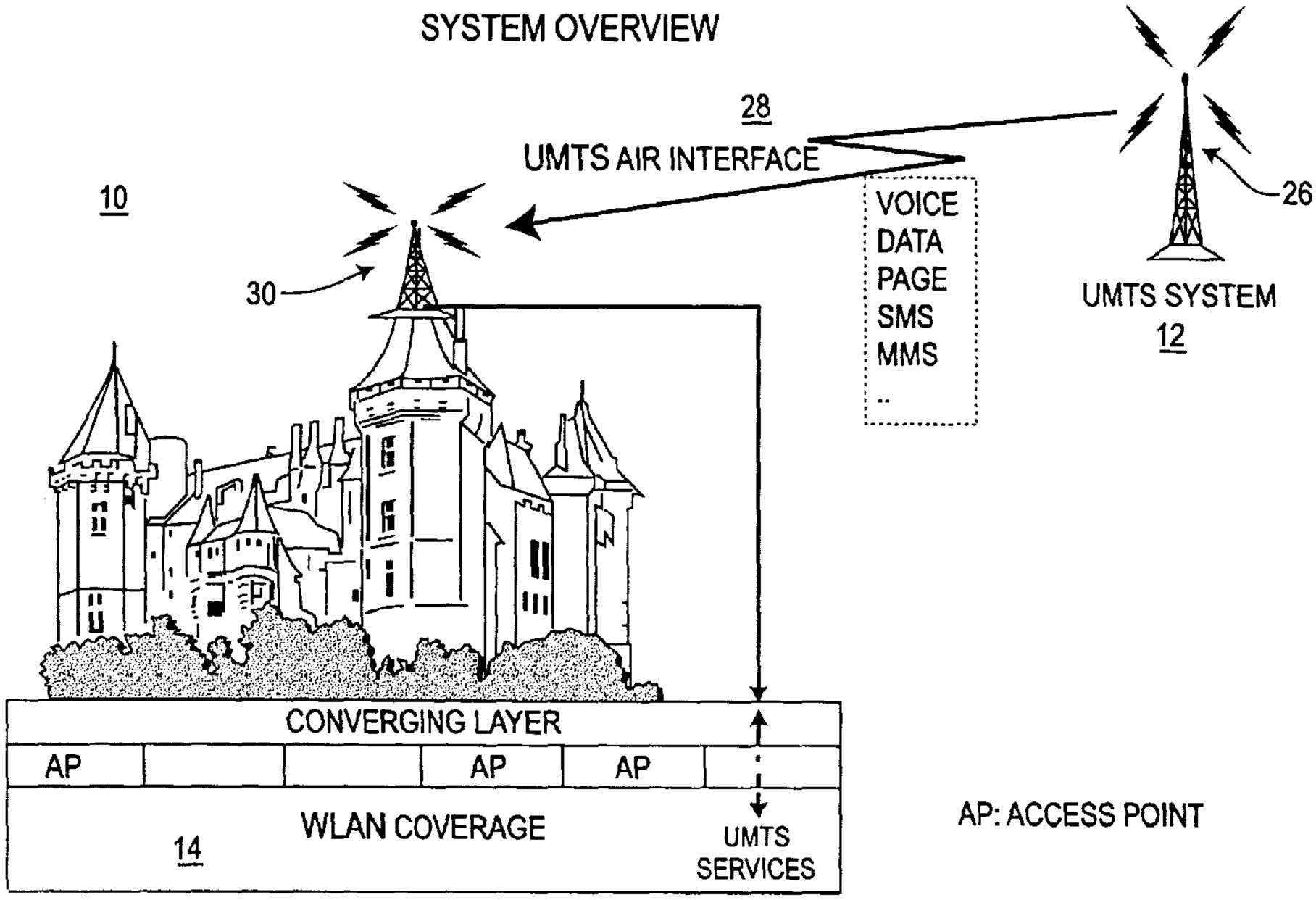
(54) Titre : PROCEDE ET APPAREIL DESTINES A UNE INTERACTION WLAN-UMTS AU MOYEN D'UNE INTERFACE AIR DE L'UMTS

(54) Title: METHOD AND APPARATUS FOR WLAN-UMTS INTERWORKING EMPLOYING UMTS AIR INTERFACE



(57) Abrégé/Abstract:
A method enabling a wireless remote terminal (UE) to access a universal mobile telecommunication system (UMTS) through a wireless local area network (WLAN) wherein UMTS services are transmitted to a format converter from a UMTS transceiver and the format converter changes the format of received messages to a WLAN format before transmission to the UE which is operating in the WLAN mode.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 February 2004 (05.02.2004)

PCT

(10) International Publication Number
WO 2004/012374 A3

(51) International Patent Classification[7]: H04B 1/38, H04Q 7/20,

(21) International Application Number: PCT/US2003/022728

(22) International Filing Date: 22 July 2003 (22.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/399,787 31 July 2002 (31.07.2002) US
10/319,180 13 December 2002 (13.12.2002) US

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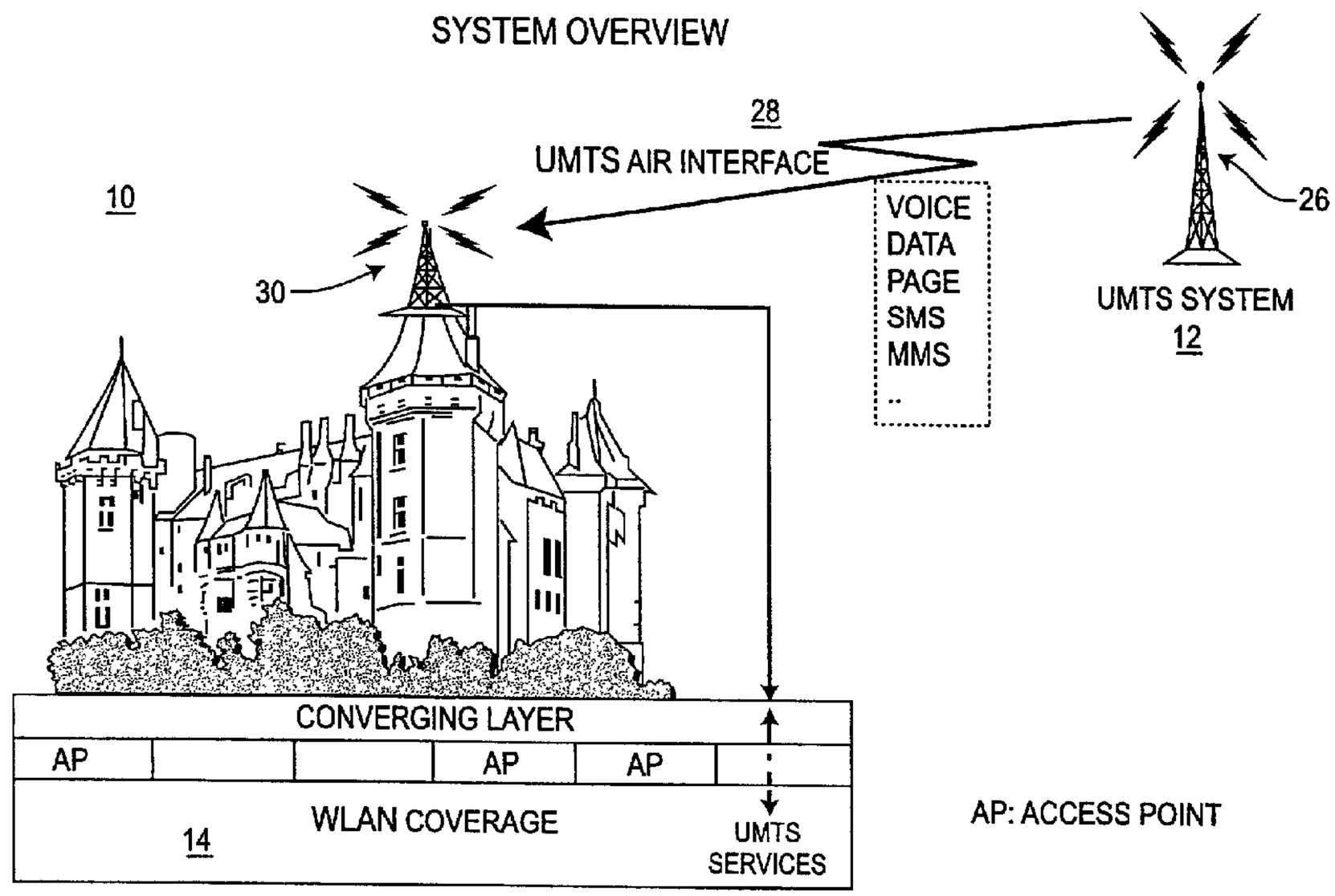
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR WLAN-UMTS INTERWORKING EMPLOYING UMTS AIR INTERFACE



(57) Abstract: A method enabling a wireless remote terminal (UE) to access a universal mobile telecommunication system (UMTS) through a wireless local area network (WLAN) wherein UMTS services are transmitted to a format converter from a UMTS transceiver and the format converter changes the format of received messages to a WLAN format before transmission to the UE which is operating in the WLAN mode.

WO 2004/012374 A3

WO 2004/012374 A3

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
13 May 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD AND APPARATUS FOR WLAN-UMTS INTERWORKING EMPLOYING UMTS AIR INTERFACE

FIELD OF INVENTION

The present invention relates to wireless communications. More particularly the invention deals with WLAN-UMTS interworking.

BACKGROUND

Subscribers, such as mobile stations (UEs), to a universal mobile telecommunication system (UMTS) which are operating under a wireless local area network (WLAN) environment and desire to access the UMTS, can incur a significant increase in costs when accessing UMTSs in those areas where the UMTS system access would be of substantial cost.

[0006] The present invention provides a less expensive alternative for accessing a UMTS without incurring such substantial costs. The composite systems of the present invention comprises a UMTS system underlayed by a WLAN system. The UMTS is provided with a transceiver acting as a UMTS radio front-end for a UMTS subscriber operating in a WLAN environment. The interface between the UMTS system and the end user (UE) is obtained through the WLAN interface.

[0007] The WLAN system converts received UMTS messages and/or traffic for pre-registered users into a format suitable for WLAN transmission to be delivered to users operating in WLAN environments. In addition, the WLAN converts transmitted messages and traffic flows into UMTS formats which is then transmitted to the UMTS system by way of the UMTS transceiver supporting the WLAN system. The WLAN users gain access to the UMTS system through a UMTS air interface employing a translator.

BRIEF DESCRIPTION OF THE FIGURES

The present invention will be understood from a consideration of the accompanying description and drawings in which like elements are

designated by like numerals and, wherein:

Figure 1 is a diagram of a UMTS system underlayed by a WLAN system.

Figures 2 and 3 are diagrams showing the message utilized for the WLAN-UMTS interworking in accordance with the apparatus and methods of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows an arrangement 10 useful in explaining the interworking between a UMTS system 12 and WLAN system 14. The arrangement of Figure 1 will be described in conjunction with the technique for delivery of UMTS based services when a mobile station such as a remote terminal is served by the WLAN system.

[0014] Making reference to Figure 2, and, where appropriate, Figure 1, there is shown an arrangement similar to that of Fig. 1.

[0015] Only one mobile station 24 is shown for purposes of simplicity, it being understood that a plurality of such mobile terminals are serviced by the WLAN 14. Although the mobile station remote terminal (UE) 24 may also be a dual-mode terminal capable of communicating with a WLAN and a UMTS, for purposes the present invention, a WLAN-capable terminal 24 is utilized.

[0016] User terminal (UE) 24, through its WLAN capability 24A, registers with WLAN 14, at step S1. WLAN 14, at step S2, then registers the user identification (ID) for the UMTS service watch, communicating with UMTS transceiver 18. UMTS transceiver 18 is tuned for any services addressed to registered users' identifications (IDs). When a UMTS service, such as a page, short message service (SMS), multimedia message service (MMS) or the like is to be delivered, UMTS 12 transfers such a service, in the example given a page message, at step S3, the page message being delivered to UMTS transceiver 18. UMTS transceiver 18, a step S4, typically from a radio tower 26, transmits the page message over UMTS air interface 28 to a

receiving radio tower 30, to format converter 16 which, at step S5, converts the present (UMTS) format into a WLAN message format and, at step S6, communicates the page message, in WLAN message format, to WLAN 14. WLAN 14, at step S7, delivers the page message to mobile terminal 24. An acknowledgement is relayed from terminal 24, at step S8, to WLAN 14, the acknowledgement being transferred to format converter 16 at step S9 and from there to UMTS transceiver 18, at step S10, and finally to UMTS 12, at step S11.

Figure 3 shows a terminal 24 similar to that shown in Fig. 2, which, through its WLAN capability 24A, registers with WLAN 14, at step S1. The WLAN 14, at step S2, forwards the user registration to format converter 16 which, at step S3, changes the format into a UMTS message format and, at step S4, provides a UMTS package switched (PS) UMTS attachment directed to the UMTS transceiver 18. UMTS transceiver 18 transfers the UMTS PS attached to UMTS 12, at step S5.

The PS attach completed message is transferred from UMTS 12 to UMTS transceiver 18, at step S6, and from UMTS transceiver 18 to format converter 16, at step S7. Format converter 16, at step S8, changes the format of the PS attach into a WLAN message format and, at step S9, conveys the message to WLAN 14 which, at step S10, provides the message to mobile terminal 24. Acknowledgement from terminal 24 to WLAN 14 occurs at step S11, from WLAN 14 to format converter 16, at step S12, from format converter 16 to UMTS transceiver 18, at step S13 and the UMTS transceiver 18 to UMTS 12, at step S14, thereby completing the acknowledgment.

* * *

CLAIMS

What is claimed is:

1. A method in which a wireless remote terminal (UE) accesses a universal mobile telecommunication system (UMTS) through a wireless local area network (WLAN), comprising:

a) said UE, when in a WLAN mode, registering with the WLAN;

b) said WLAN registering the UE with the UMTS for purposes of a UMTS service watch;

c) said UMTS, responsive to step (b), watching for UMTS messages directed to the UE registered with the UMTS;

d) said UMTS providing a UMTS service to the WLAN; and

e) said WLAN changing the format of the UMTS service to a WLAN message format and passing the reformatted message to the UE.

2. The method of claim 1 further including:

(f) providing a UMTS transceiver for performing steps (b) and (c).

3. The method of claim 1 further including:

(f) providing a format converter as part of the WLAN for receiving the UMTS service and changing the format of the UMTS service into a WLAN message format, said format converter passing the reformatted message to the WLAN for transmission to the UE.

4. A method for use by a wireless remote terminal (UE) operating within a wireless local area network (WLAN) for accessing a universal mobile telecommunication system (UMTS), comprising:

a) said UE, in a WLAN mode, registering with the WLAN;

b) said WLAN changing the format of the registration message into a UMTS format and transmitting the reformatted message to the UMTS;

c) said UMTS receiving the reformatted message;

d) said UMTS acknowledging completion of the message from the WLAN; and

e) said WLAN changing the format of the message into a WLAN message format and transmitting the message to the UE, operating in the WLAN mode.

5. The method of the claim 4 further including:

f) providing a format converter for performing the function of step (e).

6. The method of claim 4 further comprising:

(f) providing a UMTS transceiver for performing steps (b) and (c).

7. Apparatus in which a wireless remote terminal (UE) accesses a universal mobile telecommunication system (UMTS) through a wireless local area network (WLAN), comprising:

said UE having means for registering with the WLAN;

said WLAN having means for registering the UE with the UMTS for purposes of a UMTS service watch;

said UMTS including means responsive to said registering means for watching for UMTS messages directed to the UE registered with the UMTS;

said UMTS having means for providing a UMTS service to the WLAN; and

said WLAN having means for changing the format of the UMTS service to a WLAN message format and passing the reformatted message to the UE.

8. The apparatus of claim 1 further including:

(f) said UMTS registering means comprising a transceiver.

9. The apparatus of claim 1 wherein said changing means comprises a format converter for receiving the UMTS service and changing the format of the UMTS service into a WLAN message format, said format converter including means for passing the reformatted message to the WLAN for transmission to the UE.

10. Apparatus for use by a wireless remote terminal (UE) operating within a wireless local area network (WLAN) for accessing a universal mobile telecommunication system (UMTS), comprising:

said UE having a WLAN mode which includes means for registering the UE with the WLAN;

said WLAN including means for changing the format of the registration message into a UMTS format and means for transmitting the reformatted message to the UMTS;

said UMTS including means for receiving the reformatted message and means for acknowledging completion of the message from the WLAN; and

said WLAN including means for changing the format of the message into a WLAN message format and means for transmitting the message to the UE, operating in the WLAN mode.

11. The apparatus of the claim 10 wherein said means for changing comprises a format converter.

12. The apparatus of claim 10 wherein said UMTS receiving means comprises a transceiver.

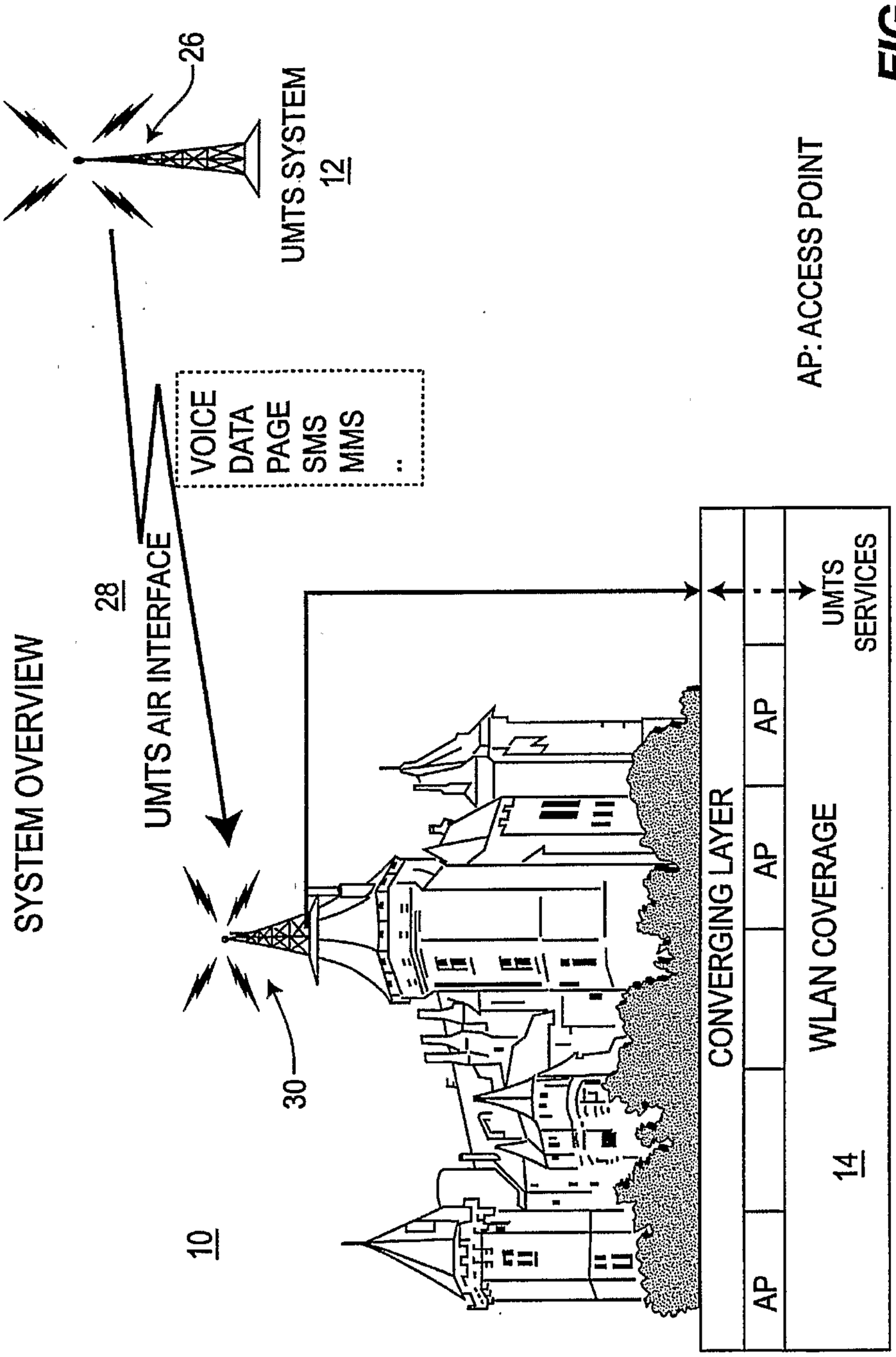

SYSTEM OVERVIEW
UMTS AIR INTERFACE
28
UMTS SYSTEM
12
VOICE
DATA
PAGE
SMS
MMS
..
AP: ACCESS POINT
UMTS
SERVICES
CONVERGING LAYER
AP
AP
AP
WLAN COVERAGE
14
30
10

FIG. 1

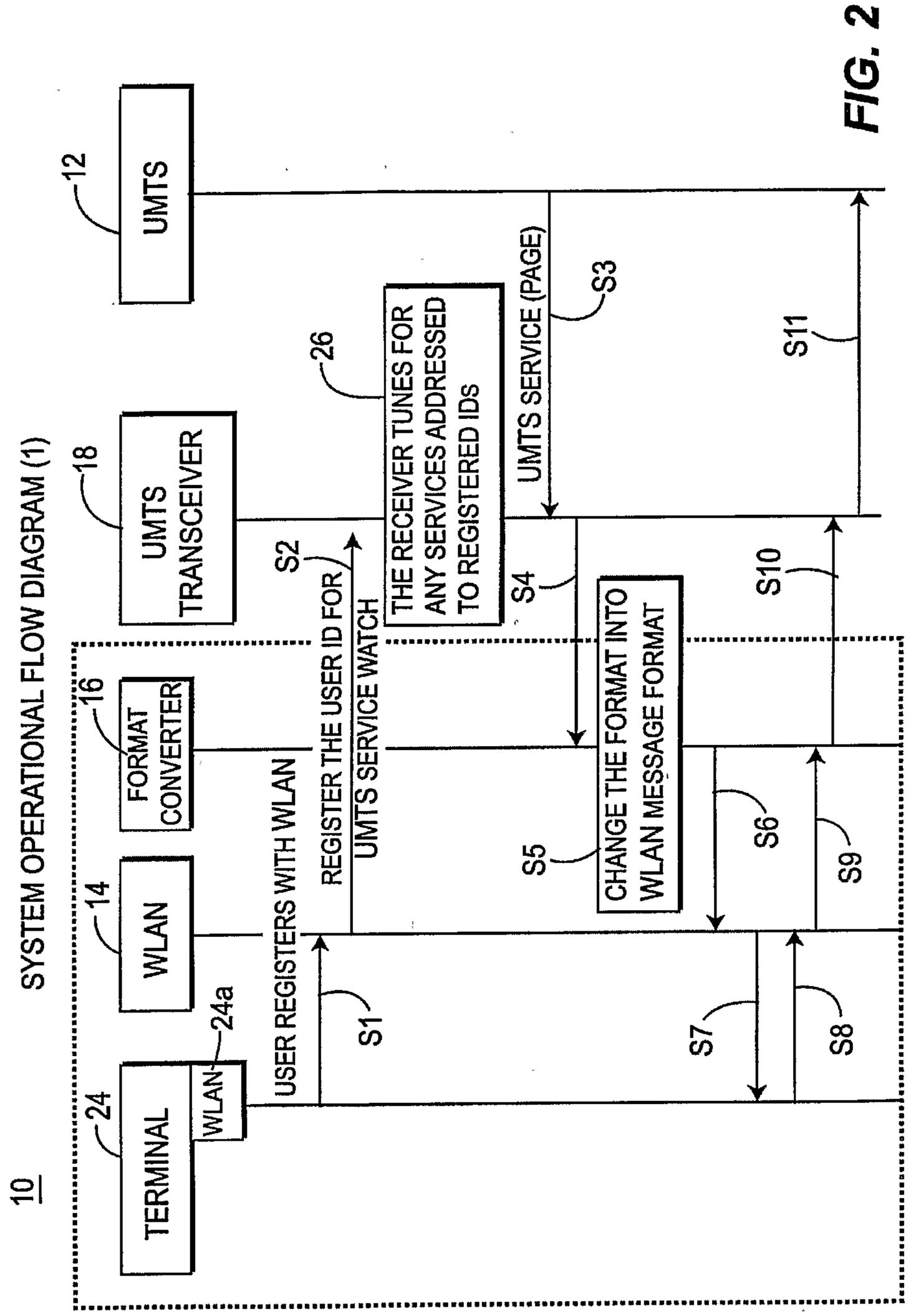

10
SYSTEM OPERATIONAL FLOW DIAGRAM (1)
TERMINAL
24
WLAN
24a
WLAN
14
FORMAT CONVERTER
16
UMTS TRANSCEIVER
18
UMTS
12
USER REGISTERS WITH WLAN
S1
REGISTER THE USER ID FOR
S2
UMTS SERVICE WATCH
THE RECEIVER TUNES FOR ANY SERVICES ADDRESSED TO REGISTERED IDs
26
UMTS SERVICE (PAGE)
S3
S4
CHANGE THE FORMAT INTO WLAN MESSAGE FORMAT
S5
S6
S7
S8
S9
S10
S11

FIG. 2

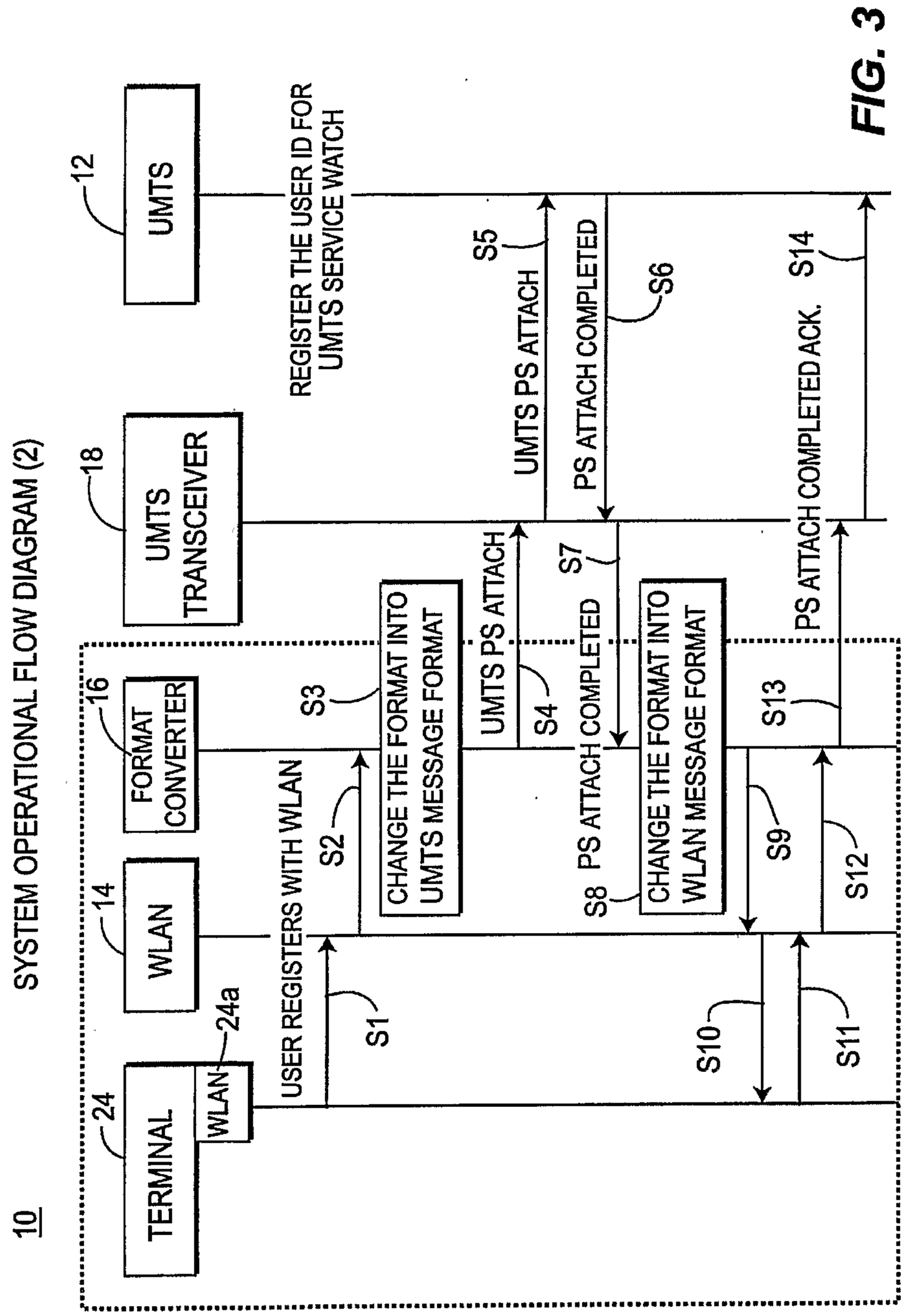
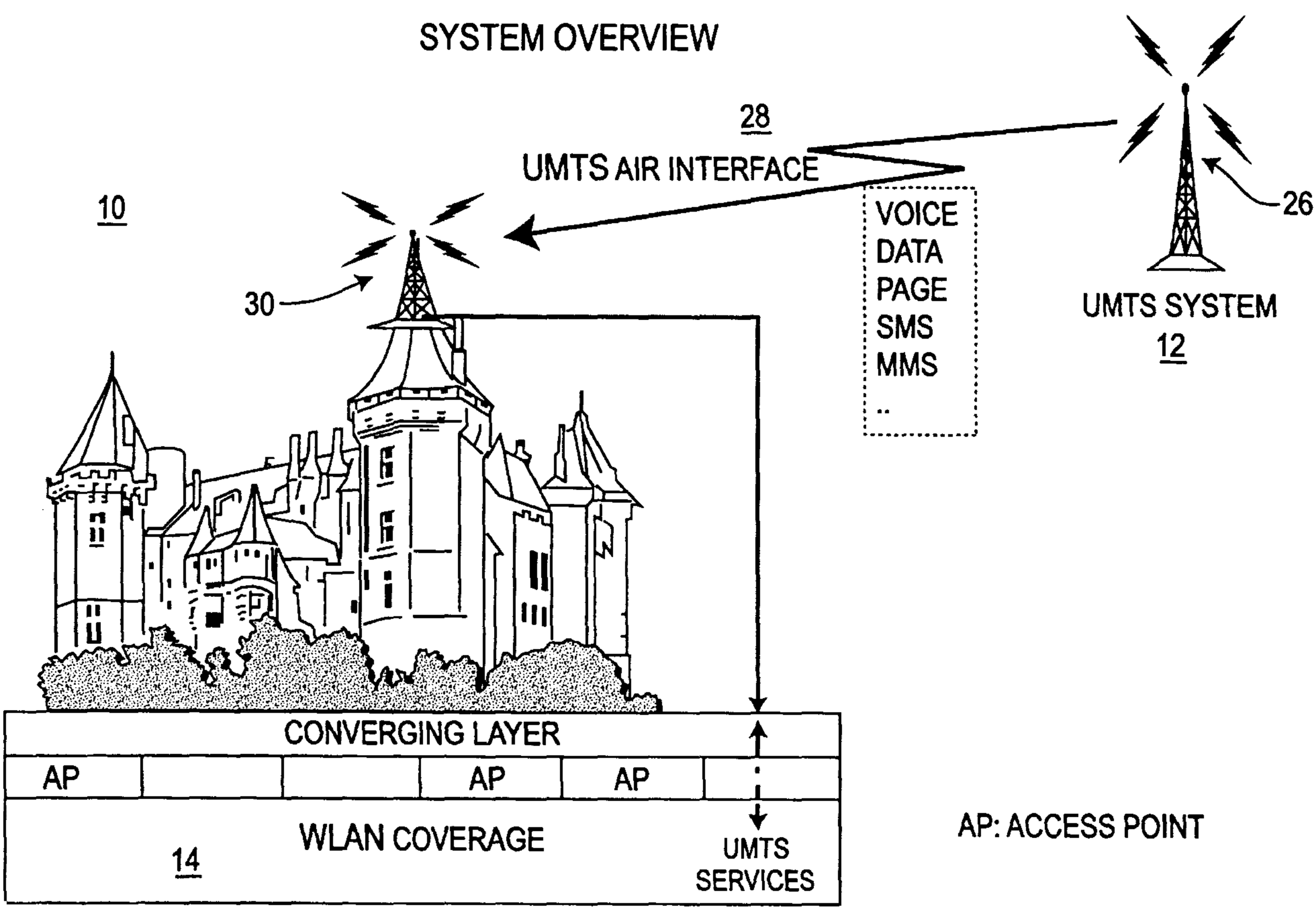

SYSTEM OPERATIONAL FLOW DIAGRAM (2)
10
TERMINAL
24
WLAN
24a
WLAN
14
FORMAT CONVERTER
16
UMTS TRANSCEIVER
18
UMTS
12
USER REGISTERS WITH WLAN
S1
S2
CHANGE THE FORMAT INTO UMTS MESSAGE FORMAT
S3
UMTS PS ATTACH
S4
S5
UMTS PS ATTACH
PS ATTACH COMPLETED
S6
S7
PS ATTACH COMPLETED
S8
CHANGE THE FORMAT INTO WLAN MESSAGE FORMAT
S9
S10
S11
S12
S13
PS ATTACH COMPLETED ACK.
S14
REGISTER THE USER ID FOR UMTS SERVICE WATCH

FIG. 3

SYSTEM OVERVIEW



AP: ACCESS POINT