Appeal Decision

Appeal No. 2014-5131

USA
Appellant ALCATEL-LUCENT USA LTD.

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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2009-549587, entitled "Method and apparatus for improving IP mobility and IP routing in ad hoc wireless network" (international publication on August 21, 2008 as WO2008/100381, and national publication on May 27, 2010 as National Publication of International Patent Application No. 2010-518780) has resulted in the following appeal decision:

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures

The present application is an application filed on January 30, 2008 (priority claim under the Paris Convention on February 12, 2007 for the United States, and on June 30, 2007 for the United States), for which an examiner's decision of refusal was issued on November 13, 2013. For this, an appeal against an examiner's decision of refusal was requested on March 18, 2014 and at the same time an amendment was made. Subsequently, in response to the notice of reasons for refusal by the body dated February 26, 2015, an amendment was made on September 3, 2015.

No. 2 The Invention

The invention relating to Claim 1 of the present application (hereinafter referred

to as the "Invention") is recognized as follows, as specified by the matters described in Claim 1 according to the scope of claims for the Written Amendment dated September 3, 2015:

"A method for routing packets in an ad hoc wireless network that includes a plurality of mobile base stations and supports a plurality of wireless devices, comprising:

receiving a user packet at a first mobile base station among the plurality of mobile base stations, the user packet being received from a first wireless device associated with the first mobile base station, the user packet being intended for a second wireless device associated with a second mobile base station among the plurality of mobile base stations, and the user packet containing an identifier of the second wireless device,

wherein the first mobile base station comprises a plurality of wireless interfaces, the plurality of wireless interfaces comprising:

a wireless access interface configured to support wireless communication with one of the wireless devices;

a wireless mesh interface configured to support wireless mesh communication between the first mobile base station and at least one other mobile base station among the plurality of mobile base stations; and

a wireless backhaul interface configured to support wireless backhaul communication between the first mobile base station and a wireless backhaul network, and

wherein the first mobile base station includes an association table which contains, for each one of the plurality of wireless devices in the ad hoc wireless network, indication of the mobile base station with which said wireless device is currently associated;

identifying the second mobile base station at the first mobile base station based on an identifier of the second wireless device and the association table;

encapsulating the received user packet to form thereby an encapsulated user packet, said encapsulating the received user packet inserting the received user packet as a payload of the encapsulated user packet, and the user packet being encapsulated using a header which comprises the identifier of the second mobile base station; and

propagating the encapsulated user packet from the first base station toward the second base station via the wireless mesh interface of the first base station."

No. 3 Cited Documents

1. Japanese Unexamined Patent Application Publication No. 2003-333053 (hereinafter referred to as "Cited Document 1," the underlines in which have been applied by the body), which is cited in the notice of reasons for refusal dated February 26, 2015 describes the following matters:

(A) "An object of the present invention is therefore to provide an autonomously formed wireless LAN system that facilitates formation of a network by easily setting access points and gateways without the necessity to consider locations for installation and/or wiring." ([0006])

(B) "An autonomously formed wireless LAN system according to Claim 1 of the present invention comprises as components a plurality of access points and gateways for providing means of access to the Internet, where wireless links are autonomously formed between the access points and between the access point and the gateway, and packet communication between wireless terminals or between a wireless terminal and the gateway is conducted by way of one or more the access points and the wireless links." ([0007])

(C) "FIG. 1 illustrates a preferred configuration of a device called a wireless multihop LAN (WMLAN), which is proposed in common for all the embodiments. In the figure, AP1 to AP4 represent access points which are either stationary or mobile, and MS1 to MS3 represent wireless terminals that can be carried and moved; namely, mobile terminals, which can exchange information via the access points AP1 to AP4 within the coverages of the access points AP1 to AP4. Due to movement of the portable terminals MS1 to MS3 or the access points AP1 to AP4, the portable terminal MS3, for example, can change its attachment from one access point AP3 to another access point AP4. This is called roaming. In such a situation, the present embodiment provides an inter-access-point communication procedure for transferring to the current access point AP4 data packets that arrive at the former access point AP3. Note that the numbers of access points AP1 to AP4 and mobile terminals MS1 to MS3 are not limited to the numbers illustrated in the embodiments.

In this embodiment, from the viewpoint of enabling relocation or movement of the access points AP1 to AP4, the access points AP1 to AP4 are connected to one another by wireless links. Specifically, the access points AP1 to AP4 for wireless

LANs can be installed at the entrance of a house by an individual, installed along a street by a local government, installed near bus stops by a bus company, or installed on mobile objects such as taxis or private vehicles, for example. By way of example, when the access point AP1 serving as the source and the access point AP4 serving as the destination are distant from each other and a packet cannot be transferred in a single hop from the access point AP1 to the access point AP4, other access points AP2 and AP3 located on the way are used for relay so that the packet is transferred to the destination access point AP4 in multiple hops. Such a form is specifically called wireless multihop LAN (WMLAN), and the access points AP1 to AP4 employed in a wireless multihop LAN are known as multihop access points.

Meanwhile, the mobiles MS1 to MS3 are terminals for use in a conventional wireless LAN (WLAN) and do not require specialized functions. That is, in the example above, the communication procedure between the mobile MS1 and the access point AP1 and between the access point AP4 and the mobile MS3 follow the same scheme as the traditional WLAN, while the communication procedure between the source access point AP1 and the destination access point AP4 is hidden from the viewpoint of mobiles MS1 and MS3. This permits existing terminals to be incorporated into a wireless multihop LAN without modification.

In a wireless multihop LAN, a mobile ad hoc network (MANET) is used for connection between access points AP1 to AP4. The mobile ad hoc network itself is known as a network in which no intermediating access point is present and information is directly exchanged between mobile terminals by radio (see The Journal of Institute of Electronics, Information and Communication Engineers, Vol. 84, No. 2, pp.127-134, February 2001). Such a mobile ad hoc network does not rely on base stations or a wired network connecting between base stations, which are essential elements for configuration of a conventional mobile communication network. In the network, mobile terminals themselves behave as mutually equal network elements in an autonomous and distributed manner. The MANET further has a function to permit mobile terminals that are outside each other's coverage and cannot directly exchange information to achieve information exchange by way of intervening mobile terminals. A feature of the present invention is that it utilizes this function for connection between access points AP1 to AP4, or as described below, between gateway GW1 to GW3 and access point AP1 to AP4 rather than between mobile terminals.

While the access points AP1 to AP4 function as access points for a WLAN, communication between access points AP1 to AP4 is performed by use of the wireless multihop function of MANET. That is, the access points AP1 to AP4 each

have two wireless interfaces including a first wireless device 11 which provides WLAN services for performing communication with mobiles MS1 to MS3, and a second wireless device 12 for performing MANET wireless multihop communication with other access points AP1 to AP4." ([0040]-[0044])

(D) "FIG. 4 shows the protocol hierarchy structure of a WMLAN based on IP-IP encapsulation. Again, consider an example where packets are transferred by multihop from the mobile terminal MS1 which is covered by the access point AP1 to the mobile terminal MS3 which is covered by the access point AP3.

A WLAN layer 21 is formed as a collection of a number of BSSs, and one BSS forms one physical network. In the figure, in place of the TCP/IP layer 33 in FIG. 3 described above, a TCP/UDP layer 37 consisting only of the transport layer in the protocol hierarchy structure and an IP layer 38 as the network layer are separately described.

Assume that a mobile terminal MS1 belonging to a certain BSS transmits frames to a mobile terminal MS2 belonging to another BSS. The mobile terminal MS1 selects as the default (initial configuration) route the access point AP1 belonging to the same BSS as the mobile terminal MS1. IP packets received by the source access point AP1 are IP encapsulated in the access point AP1 and transferred to the destination access point AP3 by wireless multihop. When the destination access point AP3 receives the IP packets, it takes and reconstructs the frames encapsulated in the packets, and transmits the IP packets to the destination mobile terminal MS2, which is covered by the area of the access point AP3.

In order to support the mobility of mobile terminals MS1 to MS3 during communication, the IP addresses of the mobile terminals MS1 to MS3 are prevented from changing due to their movement. The source access point AP1 needs to determine the IP address of the destination access point AP3 which corresponds to the IP address representing the network address of mobile terminal MS2 to which packets are to be transferred. To the end, the access points AP1 to AP3 each manage a list of IP addresses of the individual access points AP1 to AP4 and the mobile terminals MS1 to MS3 covered by them.

As described, in the WMLAN, the individual access points AP1 to AP4 provide common WLAN services to the mobile terminals MS1 to MS3, while connection between the access points AP1 to AP4 is achieved through wireless multihop communication according to MANET. Accordingly, the size of the network formed by a WMLAN can be easily changed by adding or removing access points AP1 to

AP4." ([0052]-[0056])

(E) "In the WMLAN topology configuration shown in FIG. 1, an Internet access gateway for connecting the WNLAN to the Internet is required in order to create an environment in which the mobile terminals MS1 to MS3 can access the Internet via the WMLAN. FIG. 8 shows an example of this. (Omitted) RT1 to RT3 represent routers connected between the gateway GW and the Internet 43; as is well known, they are provided respectively for the gateways GW1 to GW3 as equipment for relaying packets between different networks. The configuration of the WMLAN 40 is similar to the one shown in FIG. 1." ([0091])

In the description in (D) "consider an example where packets are transferred by multihop from the mobile terminal MS1 which is covered by the access point AP1 to the mobile terminal MS3 which is covered by the access point AP3", the term "mobile terminal MS3" is obviously a mistake for "mobile terminal MS2" from the description in FIG. 4.

Summarizing from (A) to (E), Cited Document 1 describes:

"A method for transferring packets by multihop from a mobile terminal MS1 which is covered by an access point AP1 to a mobile terminal MS2 which is covered by an access point AP3, in an autonomously formed wireless LAN system which comprises a plurality of access points AP1 to AP4 which are capable of moving, and gateways for providing means of access to the Internet, and in which wireless links are autonomously formed between the access points and between the access point and the gateway, and packet communication between wireless terminals or between a wireless terminal and the gateway is conducted by way of one or more the access points and the wireless link, wherein

when the mobile terminal MS1 sends frames to the mobile terminal MS2, the mobile terminal MS1 selects as the default (initial configuration) route the access point AP1 belonging to the same BSS as the mobile terminal MS1, and IP packets received by the source access point AP1 are IP encapsulated in the access point AP1 and transferred to the destination access point AP3 by wireless multihop;

the access points AP1 to AP4 each have two wireless interfaces including a first wireless device 11 which provides WLAN services for performing communication with the mobile terminals MS1 to MS3 and a second wireless device 12 for performing MANET wireless multihop communication with other access points AP1

to AP4;

the access points AP1 to AP3 each manage a list of the IP addresses of the individual access points AP1 to AP4 and the mobile terminals MS1 to MS3 covered by them; and

the source access point AP1 determines the IP address of the destination access point AP3 which corresponds to the IP address representing the network address of the mobile terminal MS2 to which packets are to be transferred" (hereinafter referred to as "Cited Invention 1").

2. Japanese Unexamined Patent Application Publication No. 2005-236767 (hereinafter referred to as "Cited Document 2"), National Publication of International Patent Application No. 2007-502056 (hereinafter referred to as "Cited Document 3"), and National Publication of International Patent Application No. 2005-535172 (hereinafter referred to as "Cited Document 4"), which are cited in the notice of reasons for refusal dated February 26, 2015, include the following descriptions.

2-1. Cited Document 2

(F) "The present invention generally relates to a communication apparatus, a relay apparatus, a communication system, and a method for communication, and particularly, to the communication through an ad hoc network comprising multiple communication apparatuses." ([0001])

(G) "A communication system according to the present embodiment includes a network 1 in which wireless LAN stations 3-1 through 3-4 are provided. The network 1 is connected with another network 2 via gateways 5-1 and 5-2. A wireless LAN terminal 4-1 can communicate with the network 1 by air. The wireless LAN stations 3-1 through 3-4 operate as communication apparatuses for controlling routes in the network 1. The wireless LAN terminal 4-1 may not have functionality for controlling routes in the network 1.

The wireless LAN stations 3-1 through 3-4 can be connected with each other by air. The wireless LAN station 3-4 is connected with a gateway 5-1 by air, and the wireless LAN station 3-3 is connected with a gateway 5-2 by air. As described above, the wireless LAN stations 3-1 through 3-4 form a mesh network." ([0029] and [0030])

2-2. Cited Document 3

(H) "The NAPs 101 can communicate with the Mesh Gateways 103, directly with the

network 106 via backhaul communication links 107, and/or to nearby network nodes 102. It should be understood that backhauls may be wired or wireless." ([0015])

2-3. Cited Document 4

(I) "System 20 includes a radio base station 24 and a plurality of subscriber stations 28a, 28b...28n. A radio base station 24 is connected to at least one data telecommunications network (not shown), such as a land line-based switched data network, a packet network, etc. , by an appropriate gateway and one or more backhauls (not shown), such as a T1, T3, E1, E3, OC3 or other suitable land line link, or can be a satellite or other radio or microwave channel link or any other link suitable for operation as a backhaul as will occur to those of skill in the art. " ([0012])

2-4. Based on the matters (F) to (I) described in Cited Documents 2 to 4 (well-known arts), Cited Documents 2 to 4 describes

"equipping wireless base stations with wireless interfaces for connecting to a wireless backhaul network" (hereinafter referred to as "well-known art").

No. 4 Comparison between the Invention and Cited Invention 1

1. The "access point AP1" and the "access point AP3" of Cited Invention 1 are capable of moving as indicated by the descriptions in (C): "AP1 to AP4 represent access points which are either stationary or mobile" and "the access points AP1 to AP4 for wireless LANs can be (omitted) installed on mobile objects such as taxis or private vehicles, for example". They thus respectively correspond to the "first mobile base station" and "second mobile base station" described in the Invention.

2. The "mobile terminal MS1" and the "mobile terminal MS2" of Cited Invention 1 respectively correspond to the "first wireless device" and "second wireless device" described in the Invention.

3. "An autonomously formed wireless LAN system which comprises a plurality of access points and gateways for providing means of access to the Internet, and in which wireless links are autonomously formed between the access points and between the access point and the gateway, and packet communication between wireless terminals or between a wireless terminal and the gateway is conducted by way of one or more the access points and the wireless link" of Cited Invention 1 is intended to

"facilitate formation of a network by easily setting access points and gateways without the necessity to consider locations for installation and/or wiring" as mentioned in (A), and in the system, "packet communication between wireless terminals or between a wireless terminal and the gateway is conducted by way of one or more the access points and the wireless link" as mentioned in (B). Thus, it corresponds to "an ad hoc wireless network that includes a plurality of mobile base stations and supports a plurality of wireless devices" described in the Invention. "A method for transferring packets by multihop from mobile terminal MS1 which is covered by the access point AP1 to mobile terminal MS2 which is covered by the access point AP3" of Cited Invention 1 is a method for transferring packets in a wireless LAN, so it corresponds to the "method for routing packets" described in the Invention.

4. According to Cited Invention 1, in "transferring packets by multihop from the mobile terminal MS1 which is covered by the access point AP1 to the mobile terminal MS2 which is covered by the access point AP3", "when the mobile terminal MS1 sends frames to the mobile terminal MS2, the mobile terminal MS1 selects the access point AP1 belonging to the same BSS as the mobile terminal MS1 as the default (initial configuration) route, and IP packets received by the source access point AP1 are IP encapsulated in the access point AP1 and transferred to the destination access point AP3 by wireless multihop". Thus, it can be construed that the access point AP1 receives an IP packet sent by the mobile terminal MS1 and the IP packet is intended for the mobile terminal MS2, which is managed by the access point AP3. Also, it is obvious that the IP packet sent from the mobile terminal MS1 to the mobile terminal MS2 contains the identifier of the mobile terminal MS2 as its destination.

It follows that the Cited Invention 1 encompasses the matter set forth by the Invention, "receiving a user packet at a first mobile base station among the plurality of mobile base stations, the user packet being received from a first wireless device associated with the first mobile base station, the user packet being intended for a second wireless device associated with a second mobile base station among the plurality of mobile base stations, and the user packet containing an identifier of the second wireless device".

5. The "first wireless device 11 which provides WLAN services for performing communication with mobiles MS1 to MS3" and "second wireless device 12 for

performing MANET wireless multihop communication with other access points AP1 to AP4" of Cited Invention 1 respectively correspond to the "wireless access interface configured to support wireless communication with one of the wireless devices" and the "wireless mesh interface configured to support wireless mesh communication between the first mobile base station and at least one other mobile base station among the plurality of mobile base stations" described in the Invention.

Also, considering from FIG. 2 of the present application, the "(wireless) backhaul interface configured to support (wireless) backhaul communication between the first mobile base station and a (wireless) backhaul network" described in the Invention is an interface used for wirelessly connecting a mobile base station to the Internet, which is an existing network infrastructure. Also in Cited Invention 1, as described in (B) and (C), the access points in the Cited Invention 1 are connected with gateways, which provide means of access to the Internet. Thus, the "access points" in Cited Invention 1 can be concluded to be equipped with the "backhaul interface configured to support backhaul communication between the first mobile base station and a backhaul network" described in the Invention.

6. Since the access points AP1 to AP3 in Cited Invention 1 "manage a list of IP addresses of the individual access points AP1 to AP4 and the mobile terminals MS1 to MS3 covered by them", the access points in Cited Invention 1 have "an association table which contains, for each one of the plurality of wireless devices in the ad hoc wireless network, indication of the mobile base station with which said wireless device is currently associated" described in the Invention.

7. The access point AP1 of Cited Invention 1 is to "determine the IP address of the destination access point AP3 which corresponds to the IP address representing the network address of the mobile terminal MS2 to which packets are to be transferred" and in doing so, it naturally uses a list of the IP addresses of the mobile terminals managed by the access point. The access point AP1 of Cited Invention 1 accordingly includes the step of "identifying the second mobile base station at the first mobile base station based on an identifier of the second wireless device and the association table" described in the Invention.

8. At the access point AP1 in Cited Invention 1, "the IP packets received by the source access point AP1 are IP encapsulated in the access point AP1 and transferred to the destination access point AP3 by wireless multihop," and in this process, the

access point AP1 should "The source access point AP1_determines the IP address of the destination access point AP3 which corresponds to the IP address representing the network address of the mobile terminal MS2 to which packets are to be transferred". It is therefore obvious that it uses the IP address of the access point AP3 as a header when encapsulating the received IP packet.

Consequently, Cited Invention 1 encompasses the step of "encapsulating the received user packet to form thereby an encapsulated user packet, said encapsulating the received user packet inserting the received user packet as a payload of the encapsulated user packet, and the user packet being encapsulated using a header which comprises the identifier of the second mobile base station" described in the Invention.

9. In Cited Invention 1, an IP packet received by the source access point AP1 is IP encapsulated in the access point AP1, and when the encapsulated IP packet is transferred to the destination access point AP3 by wireless multihop, the encapsulated IP packet is transferred between access points by radio as discussed above in (B) and (C).

Consequently, Cited Invention 1 encompasses the step of "propagating the encapsulated user packet from the first base station toward the second base station via the wireless mesh interface of the first base station" described in the Invention.

In summary, the Invention and Cited Invention 1 are common in the following respects:

"A method for routing packets in an ad hoc wireless network that includes a plurality of mobile base stations and supports a plurality of wireless devices, comprising:

receiving a user packet at a first mobile base station among the plurality of mobile base stations, the user packet being received from a first wireless device associated with the first mobile base station, the user packet being intended for a second wireless device associated with a second mobile base station among the plurality of mobile base stations, and the user packet containing an identifier of the second wireless device;

wherein the first mobile base station comprises a plurality of wireless interfaces, the plurality of wireless interfaces comprising:

a wireless access interface configured to support wireless communication

with one of the wireless devices;

a wireless mesh interface configured to support wireless mesh communication between the first mobile base station and at least one other mobile base station among the plurality of mobile base stations; and

a backhaul interface configured to support backhaul communication between the first mobile base station and a backhaul network, and

wherein the first mobile base station includes an association table which contains, for each one of the plurality of wireless devices in the ad hoc wireless network, indication of the mobile base station with which said wireless device is currently associated,

identifying the second mobile base station at the first mobile base station based on an identifier of the second wireless device and the association table;

encapsulating the received user packet to form thereby an encapsulated user packet, said encapsulating the received user packet inserting the received user packet as a payload of the encapsulated user packet, and the user packet being encapsulated using a header which comprises the identifier of the second mobile base station; and

propagating the encapsulated user packet from the first base station toward the second base station via the wireless mesh interface of the first base station."

The Invention differs from Cited Invention 1 in the following respects:

[The different features]

In the Invention, the first mobile base station is equipped with a wireless backhaul interface, whereas Cited Invention 1 does not specify whether the backhaul interface provided in the access point AP1 of Cited Invention 1 is wireless or not, and whether the backhaul interface provided in the access point AP1 of Cited Invention 1 is provided separately from the other interfaces.

No. 5 Judgment by the Body

The different feature is examined.

Regarding [the different features]

As mentioned above in the section "No. 3, Cited Documents 2-4, the matters described in Cited Documents 2 to 4 (well-known arts)", considering both the fact that "equipping a wireless base station with wireless interfaces for connecting to a wireless backhaul network" is a well-known art, and the fact that Cited Document 1

also implies wirelessly connecting an access point with a gateway which provides connection to the Internet as a backhaul network as described in (B) "wireless links are autonomously formed (omitted) between the access points and the gateways", implementing the backhaul interface provided in the access point AP1 of Cited Invention 1 as a wireless backhaul interface could have been easily conceived by a person skilled in the art.

Additionally, implementing the backhaul interface provided in the access point AP1 of Cited Invention 1 as a separate interface instead of integrating it into other interfaces is a matter of design variation that can be made by a person skilled in the art where appropriate.

Finally, the effects that can be achieved by the constitution of the Invention fall within a scope that can be expected from Cited Invention 1 and the well-known arts.

The Invention therefore could have been easily made on the basis of Cited Invention 1 and the well-known arts.

No. 6 Closing

As shown above, the Invention could have been easily made by a person skilled in the art based on Cited Invention 1 and the well-known arts, and thus the appellant should not be granted a patent for the invention under the provisions of Article 29(2) of the Patent Act.

Therefore, the appeal decision shall be made as described in the conclusion.

October 13, 2015

Chief administrative judge:	KATO, Keiichi
Administrative judge:	SATO, Tomoyasu
Administrative judge:	YOSHIDA, Takayuki