

PACKET SIGNAL SELECTING APPARATUS AND
MOBILE SWITCHING CENTER INCLUDING THE SAME

The present invention relates to a packet signal selecting apparatus for selecting one of a plurality of packet signals respectively transmitted through a plurality of communication paths in a mobile communication system, and a mobile switching center including the apparatus and realizing macro-diversity.

A conventional mobile communication system for vehicle telephone sets and portable telephone sets uses a small zone scheme of covering the entire service area of a mobile communication system with radio zones at a plurality of locations. In this case, a radio zone is a range in which each radio base station communicates between mobile units mounted in vehicles through radio channels. One radio base station is installed in one radio zone, and a plurality of mobile units freely move between the respective zones. Each radio base station can use a plurality of radio channels and determines a radio channel to be used on the basis of a radio wave propagation environment between mobile units between which communication is to be performed. In addition, if the radio wave propagation environment for

one packet switching unit, thereby simplifying the arrangement.

In order to achieve the first object, according to the first aspect of the present invention, there is provided a packet signal selecting apparatus for a mobile communication system, said system including a plurality of mobile units, a plurality of radio base stations, each said base station communicating through a radio channel with said plurality of mobile units in a radio zone to which said mobile units are assigned, and a mobile switching center for controlling said plurality of radio base stations, in which signals are transmitted, in the form of packet signals, between said mobile switching center and said plurality of radio base stations, said packet signal selecting apparatus being designed so as to select one of a plurality of packet signals transmitted through a plurality of communication paths, so that said packet signal selecting apparatus provides said mobile switching center with means for continuously relaying the respective packet signals from said plurality of mobile units regardless of the quality of the plurality of communication paths, said apparatus comprising: an input terminal; a plurality of signal storage sections for respectively storing a plurality of packet signals input through said input terminal; switching means for distributing a plurality of packet signals continuously input through said input terminal to said plurality of signal storage sections and causing said signal storage sections to respectively store the packet signals; and a discrimination unit, connected to all said signal storage sections, for comparing some or all of the packet signals stored in all said signal storage sections with each other to select one packet signal, and outputting the selected packet signal.

In order to achieve the second object, according to the second aspect of the present invention, there is provided a mobile switching center for a mobile communication system comprising a plurality of mobile units, a plurality of radio base stations, each said base station providing communication between said plurality of mobile units in a radio zone to which said mobile units are assigned, said mobile switching center being

effective for providing overall control over said plurality of radio base stations, in which system signals are transmitted, in the form of packet signals, between said mobile switching center and said plurality of radio base stations, an input terminal of a packet signal selecting apparatus for selecting one of a plurality of packet signals transmitted through a plurality of communication paths being connected to a first packet switching unit serving as an interface between said plurality of radio base stations, and a communication signal processing unit connected to an interface for a public network being connected to an output terminal of said packet signal selecting apparatus through a second packet switching unit.

In order to achieve the third object, according to the third aspect of the present invention, there is provided a mobile switching center for a mobile communication system comprising a plurality of mobile units, a plurality of radio base stations, each said base station providing communication between said plurality of mobile units in a radio zone to which said mobile units are assigned, said mobile switching center being effective for providing overall control over said plurality of radio base stations, in which system signals are transmitted, in the form of packet signals, between said mobile switching center and said plurality of radio base stations, an input terminal of a packet signal selecting apparatus for selecting one of a plurality of packet signals transmitted through a plurality of communications paths being connected to a first packet switching unit serving as an interface between said plurality of radio base stations, and a communication signal processing unit connected to an interface for a public network being connected to said packet switching unit.

According to the first aspect of the present invention, as in a digital automobile telephone system in Japan ("Digital Automobile Telephone System", RCR STD-27, Radio System Development Center Foundation), the period of a signal generated by a modulation/demodulation unit in a

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will be described in detail with reference to several preferred embodiments in conjunction with the accompanying drawings.

Fig. 3 shows the arrangement of the first embodiment of a packet signal selecting apparatus according to the present invention. Referring to Fig. 3, reference numeral 100 denotes a packet signal selecting apparatus; 101 and 102, signal storage sections; 103, an input terminal; 104, a switch; 105, a discrimination unit; and 106, an output terminal. Fig. 4 shows the format of a packet signal transmitted between a radio base station and a mobile switching center.

Assume that the switch 104 is connected to the signal storage section 101 in an initial condition. When a signal from a mobile unit is received at a radio base station, a signal-to-noise ratio is added, as discrimination data, to the signal to form a packet signal. Note that as the discrimination data, signal quality data may be used. The packet signal input through the input terminal 103 is stored in the signal storage section 101 through the switch 104. Thereafter, the switch 104 switches the packet signal input designation to the signal storage section 102. The discrimination unit 105 compares the discrimination data in packet signals stored in the signal storage sections 101 and 102 with each other at predetermined time intervals. If a

terminal 106 and erases the packet signals stored in the signal storage sections 111, 112, and 113.

Fig. 6 shows the arrangement of an embodiment of a mobile switching center according to the present invention defined in claim 2. Referring to Fig. 6, reference numeral 200 denotes a mobile switching center; 201, a public network interface for interfacing between a public network and a mobile communication network; 202 and 203, communication signal processing units; 204, a packet signal selecting apparatus; 205 and 206, packet switching units; 210 and 220, radio base stations; and 230, a mobile unit. Note that the packet signal selecting apparatus 204 may be a packet signal selecting apparatus realized by the invention according to a first embodiment thereof, or a packet signal selecting apparatus having a plurality of input terminals. The communication signal processing units 202 and 203 correspond to voice processing units 4 and 5 and serve to compress signals. The voice processing units 4 and 5 are designed to process only voice signals. In contrast to this, the communication signal processing units 202 and 203 are designed to process FAX signals and data as well as voice signals.

Assume that signals transmitted from the mobile unit 230 are received by the radio base stations 210 and 220. In this case, the radio base stations 210 and 220 respectively add data representing signal-to-noise ratios, obtained at

210. In this case, the packet signal transmitted to the packet switching unit 206 is transferred to the packet switching unit 205 without the intervention of the packet signal selecting apparatus 204 even if a partner is present in the public network. The signal is then transmitted to the public network through the communication signal processing unit 202 (or 203) and the public network interface 201. With this operation, the required number of packet signal selecting apparatuses 204 is smaller than the number of communication signal processing units, thereby achieving a reduction in size of the overall arrangement.

Fig. 7 shows the arrangement of another embodiment of a mobile switching center according to the present invention. Referring to Fig. 7, reference numeral 300 denotes a mobile switching center; 301, an interface for interfacing between a public network and a mobile communication network; 202 and 203, communication signal processing units; 204, a packet signal selecting apparatus; 305, a packet switching unit; 210 and 220, radio base stations; and 230, a mobile unit. Note that the packet signal selecting apparatus 204 may be a packet signal selecting apparatus realized by the invention according to the first embodiment thereof, or a packet signal selecting apparatus having a plurality of input terminals.

Assume that signals transmitted from the mobile unit 230 are received by the radio base stations 210 and 220. In this case, the radio base stations 210 and 220 respectively add data indicating signal-to-noise ratios, obtained at the time of reception, to the signals to form packet signals, and transmit the packet signals to the mobile switching center 300. Since the signals from the same mobile unit are simultaneously received by the plurality of radio base stations, the respective packet signals are input to the packet signal selecting apparatus 204 through the packet switching unit 305. The packet signal selecting apparatus 204 compares the signal-to-noise ratio data of the received two packet signals with each other, and outputs a signal having a higher signal-to-noise ratio to the packet switching unit 305. The packet signal transferred to the packet switching unit 305 is decoded by the communication signal processing unit 202 when a partner is present in the public network. The resultant signal is then transmitted to the public network through the public network interface 301. If the partner is present in the same mobile communication network, the packet signal is returned by the packet switching unit 305 to be transmitted to the partner. With this operation, communication between mobile units in the same mobile communication network can be performed without the intervention of a communication signal processing unit,

CLAIMS

1. A packet signal selecting apparatus for a mobile communication system, said system including a plurality of mobile units, a plurality of radio base stations, each said base station communicating through a radio channel with said plurality of mobile units in a radio zone to which said mobile units are assigned, and a mobile switching center for controlling said plurality of radio base stations, in which signals are transmitted, in the form of packet signals, between said mobile switching center and said plurality of radio base stations, said packet signal selecting apparatus being designed so as to select one of a plurality of packet signals transmitted through a plurality of communication paths, so that said packet signal selecting apparatus provides said mobile switching center with means for continuously relaying the respective packet signals from said plurality of mobile units regardless of the quality of the plurality of communication paths, said apparatus comprising:

an input terminal;

a plurality of signal storage sections for respectively storing a plurality of packet signals input through said input terminal;

switching means for distributing a plurality of packet signals continuously input through said input terminal to said plurality of signal storage sections and causing said signal storage sections to respectively store the packet signals; and

a discrimination unit, connected to all said signal storage sections, for comparing some or all of the packet signals stored in all said signal storage sections with each other to select one packet signal, and outputting the selected packet signal.

2. A mobile switching center for a mobile communication system comprising a plurality of mobile units, a plurality of radio base stations, each said base station providing communication between said plurality of mobile units in a radio zone to which said mobile units are assigned, said mobile switching center being effective for providing overall control over said plurality of radio base stations, in which system signals are

transmitted, in the form of packet signals, between said mobile switching center and said plurality of radio base stations,

an input terminal of a packet signal selecting apparatus for selecting one of a plurality of packet signals transmitted through a plurality of communication paths being connected to a first packet switching unit serving as an interface between said plurality of radio base stations, and a communication signal processing unit connected to an interface for a public network being connected to an output terminal of said packet signal selecting apparatus through a second packet switching unit.

3. A mobile switching center for a mobile communication system comprising a plurality of mobile units, a plurality of radio base stations, each said base station providing communication between said plurality of mobile units in a radio zone to which said mobile units are assigned, said mobile switching center being effective for providing overall control over said plurality of radio base stations, in which system signals are transmitted, in the form of packet signals, between said mobile switching center and said plurality of radio base stations,

an input terminal of a packet signal selecting apparatus for selecting one of a plurality of packet signals transmitted through a plurality of communications paths being connected to a first packet switching unit serving as an interface between said plurality of radio base stations, and a communication signal processing unit connected to an interface for a public network being connected to said packet switching unit.

ABSTRACT

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A mobile switching center of this invention includes a public network interface, a communication signal processing unit for performing code translation, a packet switching unit for performing switching of a packet signal between the communication signal processing unit and a radio base station in accordance with the destination of the packet signal, and a packet signal selecting apparatus. The packet signal selecting apparatus (100) includes one input terminal (106), a plurality of signal storage sections (101, 102) for respectively storing a plurality of packet signals input through the input terminal, a switching means for distributing a plurality of continuously input packet signals to the plurality of signal storage sections and causing them to respectively store the signals, and a discrimination unit for comparing some or all of the packet signals stored in all the signal storage sections with each other to select one packet signal, and outputting the selected packet signal. (Fig. 3)