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Smartphone Personal Assistant For Radio Network Selection During Roaming

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SMARTPHONE PERSONAL ASSISTANT FOR RADIO NETWORK SELECTION DURING ROAMING

ABSTRACT

A smartphone personal assistant system for selecting a radio network during roaming is disclosed. The system makes use of the on-device assistant to understand where the device is located after a "Radio On" or landing from a flight. This information is used in conjunction with a database of frequencies and locations to instruct the radio to scan the correct frequencies. Thus, the system allows the user to operate the mobile device outside the home area network.

BACKGROUND

Wireless mobile services are made available to users when moving from one region to another through transfer of signal to adjacent cells operating at different frequencies. However, when there is a break in cellular coverage for some reason, the mobile telephone must establish connectivity to the network through to the nearest tower. If the user takes a flight, when landing, he triggers a "Radio On" event, wherein the mobile phone must scan for a registered network (RPLMN) or home network (HPLMN) as per normal out-of-coverage recovery. This has the unwanted side-effect of forcing the device to scan for a registered network or home network even if the device is now located in another country. While scanning the device, if these networks are not found, then the device will have to begin a full band scan to locate the highest priority network. This means that when the user travels from London to New York, due to disparity of bands between the two regions, the user may have to wait for more than 3 minutes without connectivity on his mobile. This is a problem which is likely to worsen with the multiplication of bands globally. To overcome this problem, a field on USIM (LRPLMNSI) has been used by the device to immediately camp on the home network and skip the RPLMN

search. While this works when landing back at the 'home' area, there is still a delay due to scan time when landing abroad. Many radio chipset vendors have also tried to make improvements to the overall scan times using heuristics and maintaining scan result history.

DESCRIPTION

This application discloses a smartphone personal assistant system for selecting a radio network during roaming. The system makes use of the on-device assistant to identify where the device is located after a "Radio On" or landing from a flight. This information is used in conjunction with a database of frequencies and locations to instruct the radio to scan the correct frequencies rather than doing a blind PLMN scan.

For example, when the user travels from London to New York (JFK airport), the smartphone assistant knows that the user will be traveling and it knows exactly when and where the user will be landing. It could fetch the frequency information of the local cells for all the carriers covering the JFK airport area. The assistant could then either provide the radio modem or the operating system (OS) the user's schedule, network and frequency information before the "Radio On" event is expected to occur .

The information passed to the radio consists of:

1. Mobile country code (MCCs) of the area to determine the availability of RPLMN and HPLMN when landing - this reduces the time consumed for searching RPLMN and HPLMN.
2. Absolute radio frequency channel numbers (xARFCNs) and/or associated Random Access Technology (RAT) information to know the priority in accessing the technologies and scanning of frequencies.

If the first intelligent scan fails using the information, the radio could revert back to its normal band scanning algorithms. The system ensures that the personal assistant:

1. Knows in advance of a “Radio On” event and determines the frequencies to scan.

2. Knows that the MCCs currently in use are clearly not in the area of the MCC of the RPLMN and HPLMN.

In one scenario, the user’s assistant understands that the user is traveling and knows when the user will land. Before “Radio Off”, the device would feed the LIST1 comprising of (but not limited to) 10 xARFCNs and RATs to be used during the “Radio On” events that occur near the expected landing time. At this “Radio On” event the radio modem would first be fed this list, and use this list to successfully attach to a network on the list. If the radio modem finds nothing, the user continues with the normal scan and 3GPP compliant priority PLMN scans. If the radio modem finds networks other than those in the list, the user could manually check the MCCs found to select an appropriate one.

If the UE or the database determines that the landing MCC is considered physically far enough from the mobile network that it deems RPLMN and HPLMN impossible to find, the radio modem, after the “radio off” event could now automatically clear that RPLMN from memory as it is determined that it will not be found. The UE will skip the HPLMN priority search at attempt to attach to the vPLMN found as part of the LIST1 scan. It will follow normal OPLMNwAct priorities, going forward. Additionally or alternatively, the database could build these RPLMN and HPLMN exclusion lists or zones and populate these on the device.