

request, an inter-cell handoff request, or a new call request. A handoff request may be obtained from parent base station 36, a neighbor base station 38 within local group 34, a ground station 28, or a subscriber unit 26. A new call request may be received from a subscriber unit 26 or a ground station 28.

A handoff request is indicative of a need to hand off a call from one channel 58 to another. Since a call in progress has priority over a new call, handoff requests have priority over new call requests.

The generation and submission of a channel usage request comes from creating the proper data packet and the sending of that data packet to the background process of task 94. Task 94 then places the data packet into one of three FIFO (first in, first out) buffers 96, 98, or 100, according to the request type. This segregation of incoming channel usage requests by type leads to a prioritization scheme, which is discussed below. Each FIFO buffer 96, 98, or 100 may contain many channel usage requests prior to processing.

The use of FIFO buffers 96, 98, or 100 forces the sequential processing of each channel usage request of each type, based upon time of reception. Thus all channel usage requests of a given type maintain the same assigned priority.

After task 94, a decision task 102 checks inter-cell handoff request FIFO buffer 96 to see if it contains a channel usage request. If it does, task 102 passes processing to a subprocess 104 to process the inter-cell handoff channel usage request.

If an inter-cell handoff request does not exist (i.e., FIFO buffer 96 is empty), then task 102 passes processing to a decision task 106. Task 106 checks intra-cell handoff request FIFO buffer 98 to see if it contains a channel usage request. If it does, task 106 passes processing to subprocess 104 to process the intra-cell handoff channel usage request.

If an intra-cell handoff request does not exist (i.e., FIFO buffers 96 and 98 are empty), then task 106 passes processing to task 108. Task 108 checks new call request FIFO buffer 100 to see if it contains a channel usage request. If it does, task 108 passes processing to subprocess 104 to process the new call channel usage request.

Tasks 102, 106, and 108 prioritize channel usage requests. An inter-cell handoff request is priority one, and is processed before other types of channel usage requests. An intra-cell handoff request is priority two, and is processed after inter-cell handoff requests have been processed, but before new call requests are processed. A new call request is priority three, and is processed after inter-cell handoff requests and intra-cell handoff requests have been processed.

If a new call request does not exist (FIFO buffers 96, 98, and 100 are all empty), then task 108 passes processing to a decision task 110 to determine whether channel packing is required. Channel packing is an internal housekeeping function in which channels 58 are handed off between reuse units 62 (FIG. 4). Desirably, channels 58 are handed off from lesser-used reuse units 62 to greater-used reuse units 62. This is done so that lesser-used reuse units 62 may be placed out of use. Thus, those lesser-used reuse units 62 placed out of use become available to system 20 as a whole. This decreases the number of in-use reuse units 62 at parent base station 36, which decreases the likelihood of conflict with neighbor base stations 38.

If task 110 determines that channel packing is not required at this time, then processing loops back to task 72 and process 68 reiterates tasks 72 and 74, subprocess 80, and tasks 94, 102, 106, 108, and 110 until either a channel usage request is received or channel packing is required.

If task 110 determines that channel packing is required, then a task 112 generates and submits one or more channel-packing intra-cell handoff requests. The intra-cell handoff request generated by task 112 differs from a conflict resolution intra-cell handoff request generated by task 92 (FIG. 7) in that it fulfills an internal housekeeping function of parent base station 36 rather than a call-maintenance function.

Once task 112 has been performed, processing loops back to task 94. In the upcoming iteration of process 68, task 106 will find the intra-cell handoff request generated by task 112 and dispatch it to subprocess 104.

FIG. 8 depicts a flow chart of subprocess 104. Subprocess 104 assigns communication channels 58 in response to channel usage requests in accordance with a preferred embodiment of the present invention. The flow chart depicted in FIG. 8 expands on subprocess 104 depicted in FIG. 5.

Referring to FIGS. 4 and 5, a task 114 is performed wherein subprocess 104 receives and maintains a pointer to the FIFO buffer 96, 98, or 100 containing the channel usage request to be processed. This pointer, passed to subprocess 104 from parent process 68, allows subprocess 104 to always know which type of channel usage request is being processed.

A decision task 116 is then performed to determine if a free channel is available. In task 116, parent base station 36 checks allocation table 70 (FIG. 6) to determine if any of its in-use reuse units 62 contains a non-interfering out-of-use channel 58.

If task 116 determines that a free channel 58 is available, then a task 118 places that free channel 58 in use. During task 118, a channel allocation request is retrieved from the pointed-to FIFO buffer 96, 98, or 100, the designated free channel 58 is placed in use, the call being serviced begins or continues using the newly placed-in-use channel 58, and processing returns to primary process 68. Since a free channel 58 is available, parent base station 36 can refrain from further checking and can assign that free channel 58 regardless of the type of channel usage request involved.

If task 116 determines that no free channel 58 is available, then a decision task 120 determines if a reuse unit 62 is available. In task 120, parent base station 36 checks allocation table 70 to determine if any out-of-use reuse units 62 are available from the general pool of reuse units 62 in system 20.

If task 120 determines that an out-of-use reuse unit 62 is available, then a task 122 places that reuse unit 62 in use and processing loops back to task 116. In most cases, at least one channel 58 in the newly placed-in-use reuse unit 62 will be free, and task 116 readily finds an available free channel 58.

Should none of the channels 58 of the newly placed-in-use reuse unit 62 be free, task 116 will pass processing to task 120, which will check for another out-of-use reuse unit 62. This process will iterate until either a reuse unit 62 containing a free channel 58 is placed in use or task 120 determines that there are no available out-of-use reuse units 62. In-use reuse units 62 with all channels 58 out of use, whether free or not, are placed out of use as a part of a background process (not shown).

Tasks 116 and 120 constitute a pre-usage interference conflict check. That is, if task 112 found a free channel 58, then no channel-assignment conflict exists and that free channel 58 is placed in use. Likewise, if task 120 found a not-in-use reuse unit 62 containing a free channel 58, then no channel-assignment conflict exists and that free channel