security procedure (UE authentication, preparation related to radio interval ciphering, etc.) cannot be performed, and the UE is unable to successfully finish the call connection establishment procedure for the incoming call from the Internet or home network.

[0024] A possible solution to the above problem is to temporarily attach the UE to an SGSN co-located in a femto base station, and process a service request from the UE in the co-located SGSN in the femto base station. However, in this case, since security procedure are carried out in the co-located SGSN of the femto base station, information related to the UE authentication needs to be moved from the core network SGSN to the femto cell. That is to say, important information related to user authentication is memorized in a femto base station which is likely to be provided in a general user's home, and, as a result of this, there is a possibility that the security level might be degraded.

[0025] Embodiments~~It is therefore one of objectives~~ of the present invention ~~to~~ provide a base station apparatus, gateway apparatus, call connection establishment method and wireless communication system that, when there is an incoming call for a UE from the Internet or home network, are able to carry out connection setup successfully without decreasing the security level in a mobile communication network.

Solution to Problem

[0025a] According to a first aspect, there is provided a Serving General Packet Radio Service (GPRS) Support Node (SGSN) comprising: a receiver which, in operation, receives a service request message from a traffic offloading apparatus, which has received the

service request message from a user equipment (UE) in idle mode, has modified a service type in the service request message from a paging response type to an UE-initiated service request type, and has forwarded the service request message whose service type was modified to the SGSN; and a processor which, in operation, authenticates the UE using the received service request message.

[0025b] According to a second aspect, there is provided a controlling method, to be performed by a Serving General Packet Radio Service (GPRS) Support Node (SGSN), the method comprising: receiving a service request message from a traffic offloading apparatus, which has received the service request message from a user equipment (UE) in idle mode, has modified a service type in the service request message from a paging response type to an UE-initiated service request type, and has forwarded the service request message whose service type was modified to the SGSN; and authenticating the UE using the received service request message.

[0026] Disclosed herein is a~~A~~ base station apparatus comprising~~according to the present invention adopts a configuration having~~: a receiving section that receives a paging response to a paging from a wireless communication terminal apparatus; a judging section that judges whether the paging response is

a response to the paging which the base station apparatus has issued; and a transmitting section that, when the paging response is judged to be a response to the paging which the base station apparatus has issued, includes a request for change of a service request in the paging response, and transmits the paging response to a gateway apparatus.

Advantageous Effects of Invention

[0027] According to embodiments of the present invention, when there is an incoming call for a UE from the Internet or home network, it is possible to carry out call connection establishment successfully without degrading the security level in a mobile communication network.

Brief Description of Drawings

[0028]

FIG.1 shows a configuration of a wireless communication system;

FIG.2 is a sequence diagram showing the steps of call connection establishment in an IMT-2000 packet system;

FIG.3 is a sequence diagram showing the steps of directly off-loading communication traffic originating from a femto base station, to the Internet or home network;

FIG.4 is a sequence diagram showing the steps of call connection establishment in the event there is an incoming call for a UE, in a femto base station, from the Internet or home network;

FIG.5 shows a configuration of a wireless communication system according to embodiment 1 of the present invention;

FIG.6 is a block diagram showing a configuration of the femto