A new GPRS/WLAN integration architecture for operator’s WLAN implementation is proposed. For this, a new node and its protocol stack as serving GPRS access router (SGAR), which is solely implemented as WLAN access gateway. In tight coupling architecture, SGAR fulfills the functionalities of SGSN for GPRS core as well as WLAN access networks without Gb interface with access networks. SGAR is also well suited for loose coupling architecture with the difference that data packets are transmitted at Gi like interface instead of Gn interface with IP networks. In this architecture, mobile terminal always uses same cellular control signaling in GPRS as well as WLAN networks both in tight and loose coupling architecture. This avoids the use of extensible authentication protocol (EAP), RADIUS/DIAMETER and use of expensive extra SS7 network for operator WLAN implementation in loose coupling architecture.

A cellular operator can deploy its own IP networks with SIM specific centralized mobility management implementation for all mobile terminals under cellular as well as WLAN access networks. This essentially brings two issues; first, WLAN network is to be connected to GPRS networks for interworking and second, MT is to be technologically upgraded to access WLAN radio interface at hot spots. WLAN access networks can be connected to GPRS networks preferably at SGSN, which is known as tight coupling or it can be connected to external IP networks that are known as loose coupling. WLAN accessing capability of GPRS terminal is implemented by fitting additional WLAN radio interface card.

The interworking architecture for operator WLAN implementation basically depends upon the way of mobility management and hand off signaling is to be handled. This can be done in two ways: one, terminal equipment can utilize cellular signaling in WLAN or an application layer mobility management entity can be implemented. GPRS mobility management (GMM) entity resides just above logical link control (LLC) layer. To transport GPRS LLC frame over WLAN radio system at hot spots, a terminal adaptation function (TAF) at user equipment is to be implemented just above WLAN logical link layer. TAF helps GPRS terminal equipment merely to use the WLAN radio system at hot
spots. Such terminal uses its GMM entity for mobility management and hand off in WLAN area. TAF can be avoided if mobility management entity in dual mode terminal equipment is implemented at network layer or in upper layer for control signaling through WLAN. In such terminal, SIM based authentication will essentially require a SIM card reader at terminal and mobility management is to be implemented at application layer. To transport control signals, extensible authentication (EAP), which works directly over WLAN, is needed. A network access server (NAS) in access router of WLAN, transports EAP control signals using RADIUS/DIAMETER over IP networks to AAA server. An AAA server in IP networks communicates with HLR using MAP protocol at SS7 link. Besides EAP and RADIUS implementation, this architecture requires establishment of circuit switched SS7 network, which is expensive. Again Smart card reader at terminal is to be equipped with extra security provision.

We address a way of integration between GPRS/WLAN that avoids the use of EAP/RADIUS and extra SS7 signaling. In our architecture, the dual mode terminal equipment with TAF has been used in tight as well as loose coupling method that supports GPRS specific signaling with cellular core networks in WLAN.