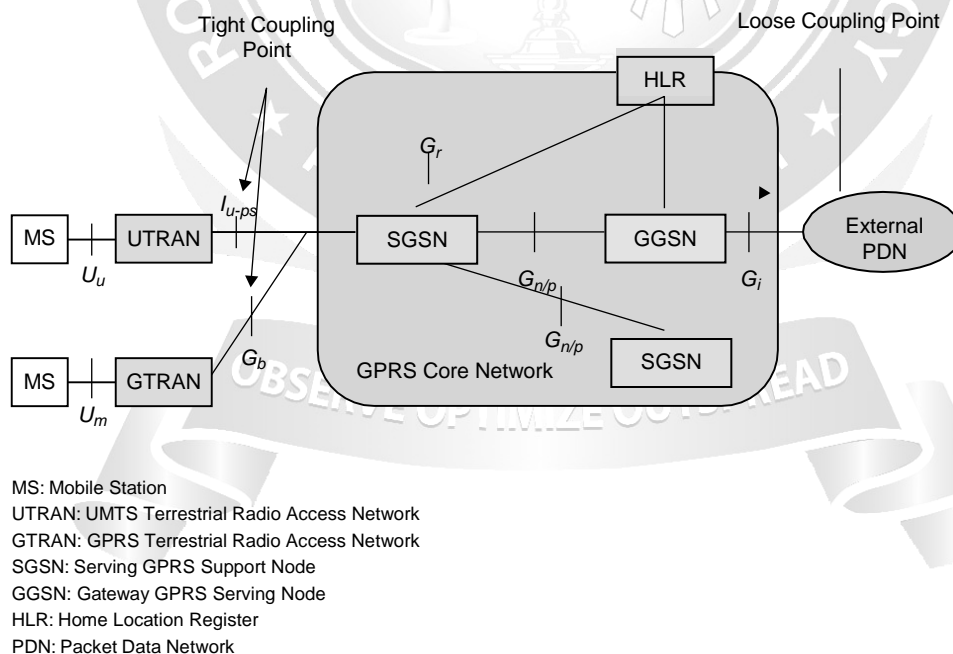


## Interworking Architectures for WLAN and GPRS

In this section, we elaborate on the ETSI specified, two generic approaches for interworking — *tight coupling* and *loose coupling*. With tight coupling the WLAN is connected to the 3GPP (GPRS) core network in the same way as any other radio access network (RAN), such as GPRS RAN and UMTS terrestrial RAN (UTRAN). In this case, the WLAN data traffic goes through the GPRS core network before reaching the external packet data networks. With tight coupling, the WLAN is connected to either  $G_b$  or  $I_{u-ps}$  reference points. On the other hand, with loose coupling, the WLAN is deployed as an access network complementary to the GPRS network. In this case, the WLAN utilizes the subscriber databases in the GPRS network but features no data interfaces to the GPRS core network. Figure shows the GPRS reference diagram for coupling points. The loose



**Figure 4.5: A GPRS reference diagram with WLAN coupling points.**

[Source: Text book- Wireless Communications and networking , First Edition, Elsevier 2007 by Vijay Garg ]

coupling architecture between the GPRS and the WLAN at the  $G_i$  reference point is indicated. This means that with loose coupling, the WLAN bypasses the GPRS network and provides direct network data access to the external packet data networks (PDNs).

The trend is to follow the loose coupling approach and use SIM or USIM-based authentication and billing. With this approach, a subscriber can reuse the SIM card or the USIM card to access a set of wireless data services over a WLAN.

In the tight coupling approach, 3GPP system-based access control and charging is used. This requires AAA for subscribers in the WLAN to be based on the same AAA procedures used in the GPRS system. An access to 3GPP GPRS-based services is used to allow the cellular operator to extend access to its GPRS-based services to subscribers in a WLAN environment. Also, seamless services scenarios provides seamless service continuity between GPRS and WLAN. The goal of 3GPP circuit-switched services is to allow the operator to offer access to circuit-switched services (e.g., normal voice calls) from a WLAN system. Seamless mobility for these services is provided. The advantages of tight coupling architecture between IEEE 802.11 WLANs and GPRS are the following:

- Seamless service continuation across WLAN and GPRS. The users are able to maintain their data sessions as they move from WLAN to GPRS and vice versa. For services with tight coupling quality of service (QoS) requirements, seamless service continuation is subject to WLAN QoS capabilities.
- Reuse of GPRS AAA
- Reuse of GPRS infrastructure (e.g., core network resources, subscriber databases, billing systems) and protection of cellular operator's investment
- Support of lawful interception for WLAN subscribers

- Increased security, since GPRS authentication and ciphering can be used on top of WLAN ciphering
- Common provisioning and customer care
- Access to core GPRS services such as short message service (SMS), location-based services and multimedia messaging services (MMS)

