

King Fahd University of Petroleum and Minerals  
College of Computer Sciences and Engineering  
Department of Computer Engineering

**CSE 550 – Computer Network Design (T052)**

**Project Description**

**Project Goal:**

The goal of the project is to integrate a universal mobile telecommunication system (UMTS) wireless network with a public wireless local area network (PWLAN) at King Fahd International Airport (KFIA) to provide for seamless connectivity and access to various data services to both UMTS and PWLAN networks users. Both networks are served by Saudi Telecom Company (STC). The architecture should allow subscribers of STC to use the high speed data services through WLAN while at KFIA and also should support service vertical handoff to the STC wireless wide area network as subscribers move out of the coverage of the WLAN. In addition, the architecture should allow users unsubscribed to STC to utilize the WLAN network using prepaid cards.

**Project Requirements:**

- Only subscribed STC wireless users are allowed to **directly** access the STC backbone network **through either the UMTS network or WLAN network**. Users unsubscribed to STC are allowed to utilize the WLAN network only through the use of prepaid cards.
- A total of 7,000 simultaneous WLAN users at any time. Should consider the impact of having different percentages of the 7,000 WLAN users being UMTS users that were handed-off to the WLAN network.
- Wireless users should have access to all the services based on their subscriber profile.
- Project must consider 2 different integration schemes as described in [1]:
  - Loose coupling
  - Open coupling
- As outlined in [2], the project should consider 3 mobility management schemes based on the following:
  - Network layer protocol Mobile IP
  - Transport layer protocol Mobile Stream Control Transmission Protocol (mSCTP)
  - Application layer protocol Session Initiation Protocol (SIP)
- The design should take into account **release 7** of the UMTS standard ([http://www.3gpp.org/ftp/Specs/archive/23\\_series/23.234/23234-700.zip](http://www.3gpp.org/ftp/Specs/archive/23_series/23.234/23234-700.zip)) as it contains provisions for WLAN integration.
- For each integration scheme and for each mobility management scheme a set of different traffic loads and application mix must be considered.
- Reliable and secure connectivity for all users to all aspects of the network.
- The final network design must specify the bandwidth required on the backbone.
- The final network design must be based on the results of simulating the different integration schemes and the mobility management schemes. Thus, the final network design must choose the integration scheme and the mobility management scheme that provides the best response time, then the best throughput.

**Assumptions:**

- Initial traffic load & initial application mix: *TBD*.

**Deliverables:**

	<b><i>Deliverable</i></b>	<b><i>Deadline</i></b>	<b><i>Weight</i></b>
1.	<ul style="list-style-type: none"><li>• Initial Network Design both loose couple and open couple integration schemes.</li><li>• Simulation results and analysis.</li></ul>	<b>Wednesday 29/03/2006</b>	<b>15%</b>
2.	<ul style="list-style-type: none"><li>• Updated Network Design to include mobility management schemes.</li><li>• Simulation results and analysis.</li></ul>	<b>Wednesday 03/05/2006</b>	<b>15%</b>
3.	<ul style="list-style-type: none"><li>• <b>Final Presentation.</b></li></ul>	<b>Wednesday 10/05/2006</b>	<b>05%</b>
4.	<ul style="list-style-type: none"><li>• <b>Publication-quality term paper.</b></li><li>• <b>Final report.</b></li></ul>	<b>Wednesday 24/05/2006</b>	<b>20%</b>

**References:**

- [1] A. Mahmoud, M. Abu-Amara, T. Sheltami, "Wireless Local Area Networks Integration for Mobile Network Operators," research proposal, November 2004.
- [2] E. Rahman, J. Jaffar, "Investigation of WLAN-Cellular Integration Architecture for Cellular Operators and Deployment Issues at King Fahd International Airport," senior design project final report, January 24, 2006.