

SEMINAR NOTICE

Department of Electrical and Systems Engineering

A Thesis Utilizing High Altitude Platforms (HAPs) to Provide Wireless Communication Coverage to Close Coverage Gaps – Case Study: Providing UMTS Service to the Non-Radar Coverage Area in the Gulf of Mexico (GOMEX)

MS Dissertation Defense

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Abstract: The increase in demand for high-capacity wireless services has posed great challenges to telecommunication service providers, especially for delivery of the ‘last mile’. Terrestrial networks are limited in some regions and costly, requiring a large number of base-stations to provide good wireless communication services. Satellite based telecommunication services have many capacity and performance limitations in voice and video communication applications. High Altitude Platforms (HAPs) have gained considerable interest in the past few years due to their potential to exploit the best aspects of terrestrial and satellite-based systems, while offering advantageous propagation characteristics. This thesis proposes utilizing High Altitude Platforms (HAPs) to provide affordable, efficient and robust telecommunication coverage for remote and oceanic regions. These platforms can carry multipurpose communications payloads that allow them to function either as a cellular base station or low satellite system. When fully deployed, they are able to provide services and applications ranging from broadband wireless access, navigation and positioning systems, remote-sensing and weather observation/monitoring systems, future generation mobile telephony, etc. The proposed system, named Gulf Of Mexico High Altitude Platforms Network (GOMEX-HAPs Net), will focus on the Gulf of Mexico because this region is of vital importance to the US and there is a 240 square mile gap where there is no wireless coverage of any kind. It will compose of unmanned HAPS flying at high altitudes over 70,000 feet to achieve maximum footprint per HAP and to ensure that it will be flying above all classes of commercial air planes (under 55,000 ft). Although this system is able to provide a variety of wireless communication service, the thesis will focus on providing 3G coverage to the gap. The thesis will begin with an introduction to wireless communication and the challenges in providing the “last mile” coverage in remote regions, followed by a comprehensive discussion about HAPs systems including their categories and advantages, and a comparison of HAPs with both terrestrial and satellite based communication networks. The proposed architecture of the GOMEX-HAP Net will be discussed next, and conclude with the HAPs footprint analysis, channel modeling and finally the system capacity.

Wednesday, April 28, 2010
10:00 a.m.
Jolley, Room 306

Research Advisor:
Professor Paul Min

This seminar is in partial fulfillment
of the Masters Degree

 **Washington University in St. Louis**
SCHOOL OF ENGINEERING & APPLIED SCIENCE