Protocol Stack Design for Short-range Ad-hoc Wireless Network

**Supervisor:**
Prof. Roger Shu-Kwan Cheng

**Co-supervisors:**
Prof. Ross Murch
Prof. C-Y Tsui

**Project Members:**
Cheung Chi Fung (99222809)
Fong Kong Yip (99052113)
Lam Simon (99044192)
Luk Chi Tin (99222902)
Recently, the emergences of WiFi™ and Bluetooth™ have a great impact on the wireless network consumer market. Despite their powerfulness, they may be over-complicated for some applications and thus lead to a longer-time-to-market. Applications like portable game devices, toys and, even video streaming may want to work on an alternative proprietary protocol with similar capabilities, but with lower cost in development and shorter development time.

In light of these considerations, we have developed a Short-range Ad-hoc Wireless Network Protocol that is simple to use, cost effective, power efficient and with competitive features.
**PROTOCOL BLOCK DIAGRAM**

**Application Programming Interface (API)**

- Link Management Unit
- GBR Unit
- Service Management Unit
- Power Management Unit

**Functionality**

- Link Control
- Media Access Control
- Ad-hoc supported
- Service Management
- Power Management
- Streaming capability

**Portability**

- Implemented mainly in C
- Low computational complexity
- Well-defined HAL Layer to isolate software from hardware

**Logical Link Control Layer**

- Frame Creation Unit
- Frame Reception Unit
- Power Saving Unit
- Channel Access Unit

**Media Access Control Layer**

- Physical Control Unit
- Physical Status
- Physical RX
- Physical TX
- RF Unit

**HAL (Physical Layer)**
RESULTS

To give a clear overview on the capabilities of our protocol. We have developed a Chat room with image streaming function and a Embedded Board to act as a mobile device to demonstrate our protocol in the real environment.

Four Mobile devices powered by our protocol communicated with each other with considerable performance.

With 1Mbps raw bit rate, Mobile device can achieve up to 420Kbps useful data rate.

The total system throughput is fairly shared among different devices in the network.

By operating on the Power-saving mode, mobile device can save up to a 93% of power.