



**HANYANG
UNIVERSITY**



Implementation of LTE Uplink system for Software Defined Radio Platform using CUDA and UHD

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I. Introduction

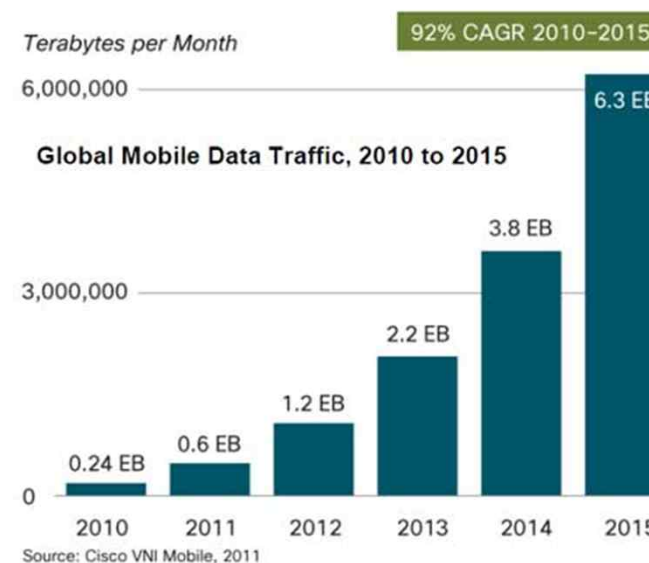
Introduction

➤ **Software Defined Radio (SDR)**

- “Radio in which some or all of physical layer functions are software defined”
 - Flexibility, Upgradability, Scalability, Extensibility

➤ **Increase in mobile data traffic**

- SDR base station requires a lot faster processing speed

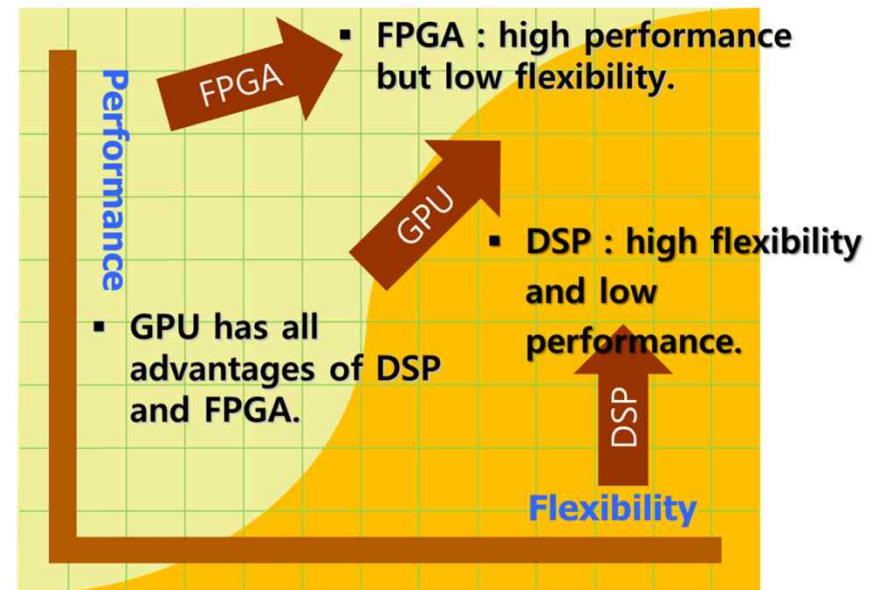
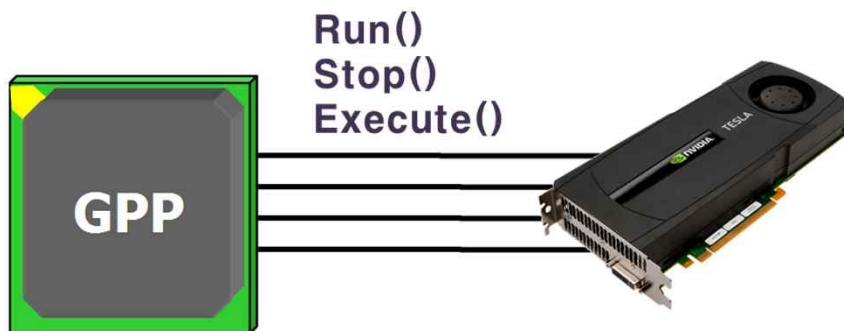


II. GPU based SDR Platform

GPU based SDR Platform

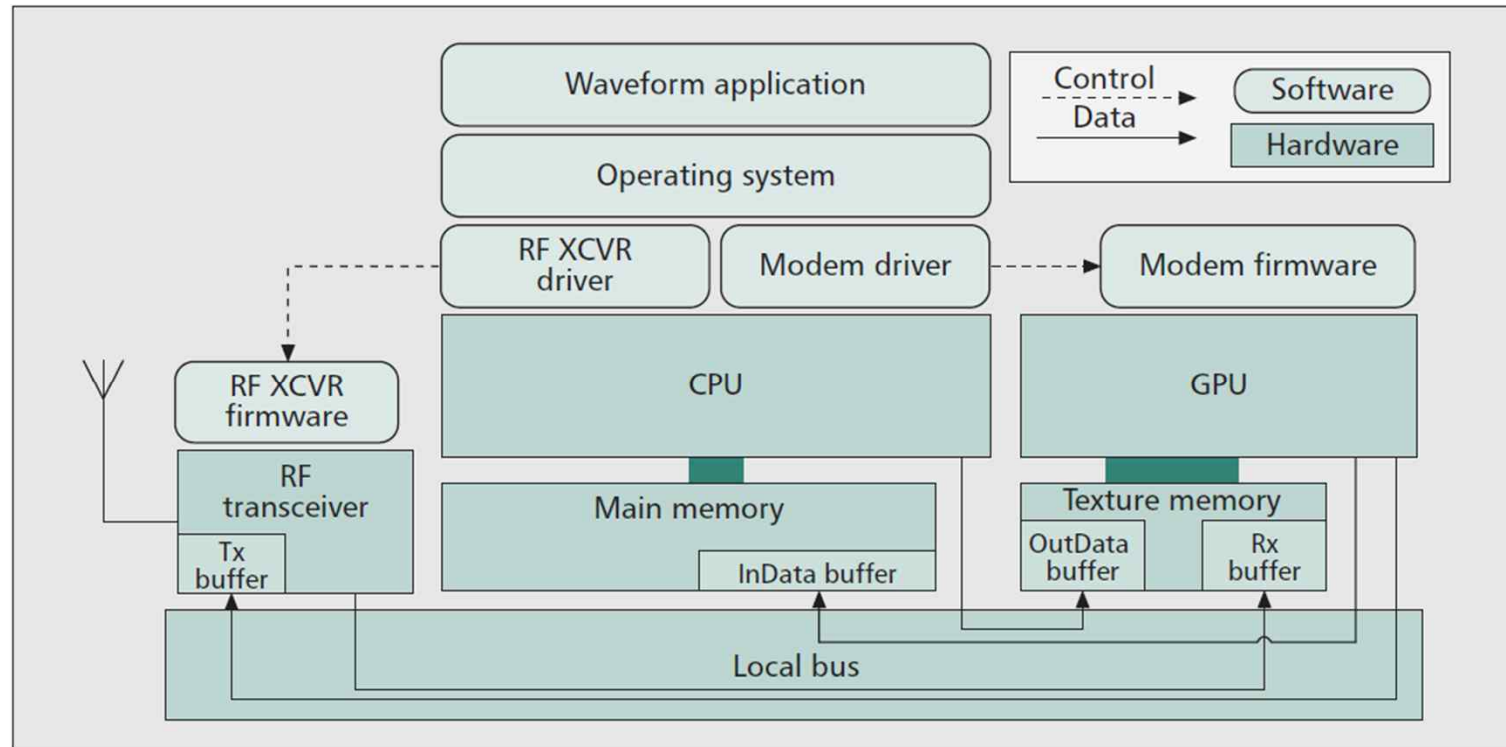
Introduction of GPU – GPU vs DSP vs FPGA

- GPU can not operate alone.
- GPU must needs a host processor such as CPU(Central Processing Unit)
- Thus, use GPU as a parallel processor and CPU as a serial processor.



GPU based SDR Platform

Software Platform for SDR System

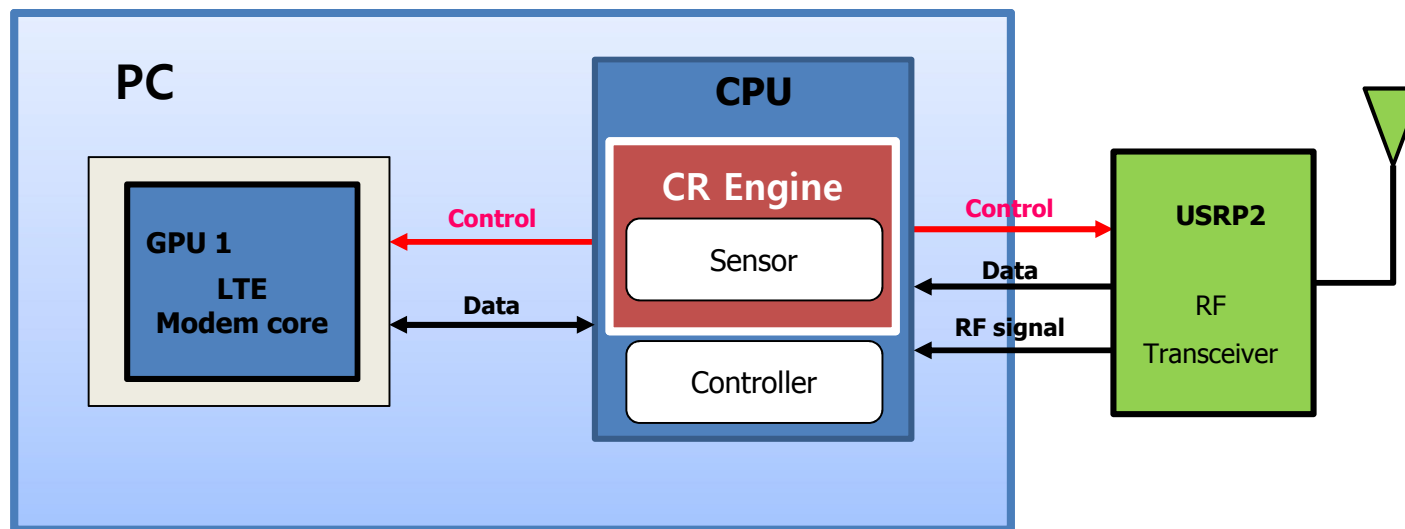


III. Implementation of

LTE Uplink System

Implementation of LTE Uplink system

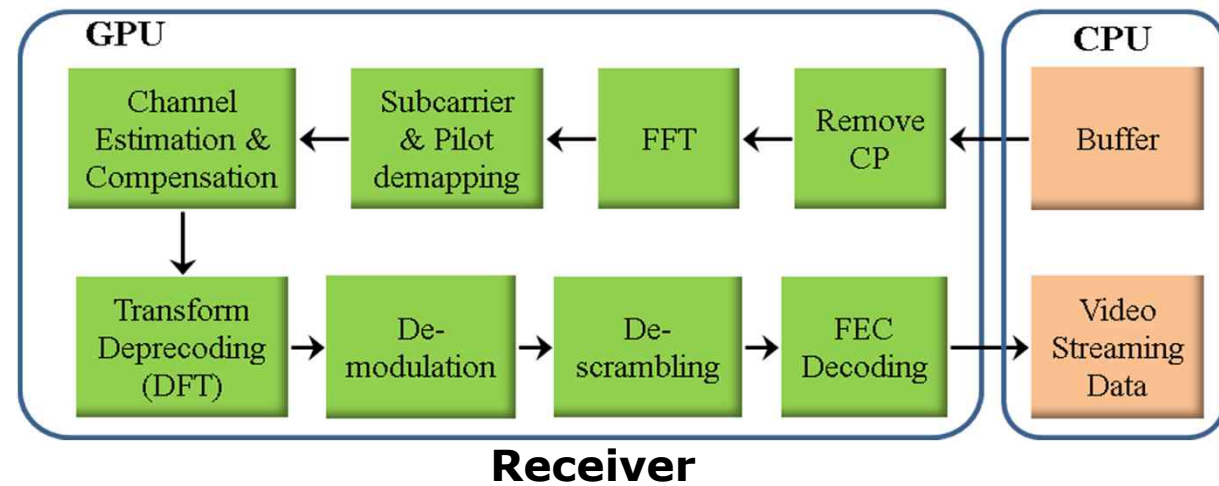
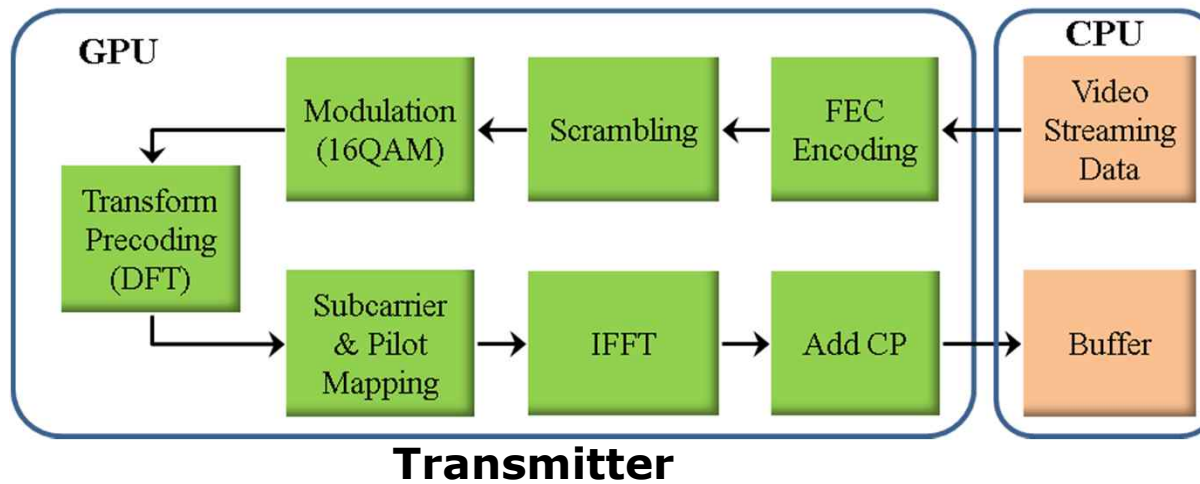
- CPU: Controls GPU modem and USRP2
- GPU modem : Software modem using CUDA (Compute Unified Device Architecture) platform
- RF transceiver: USRP2 board and RF board (RFX2400)



<Software Architecture LTE Uplink system>

Implementation of LTE Uplink system

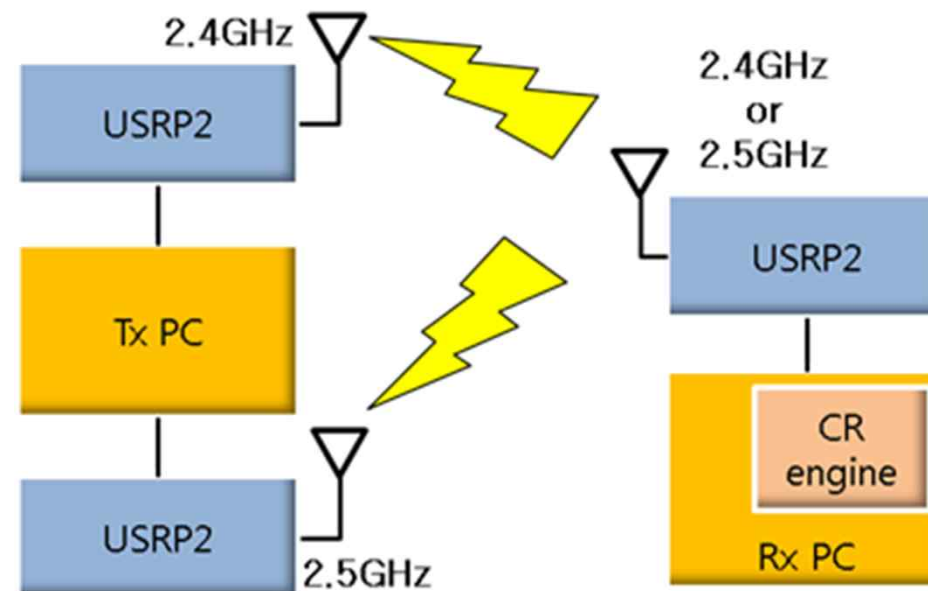
Data format of LTE UL system

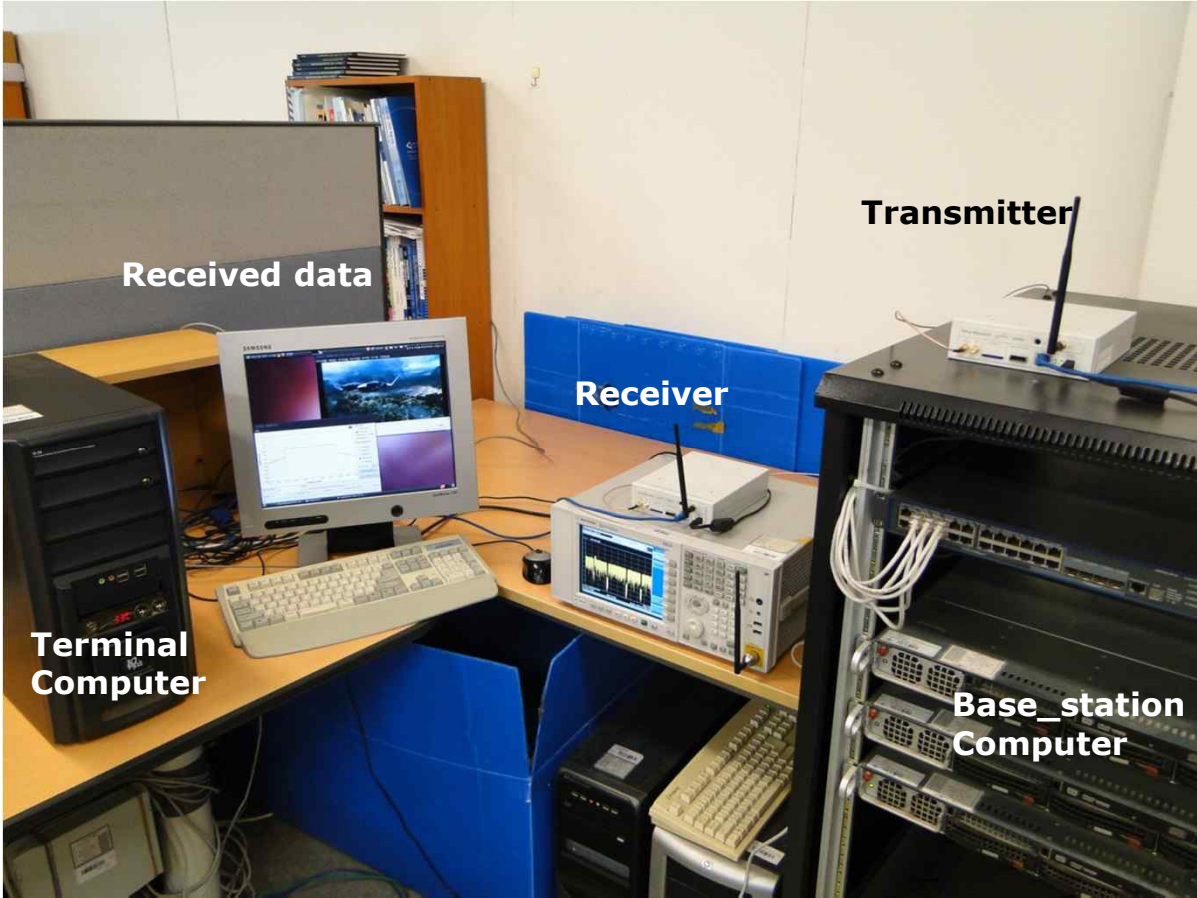


Implementation of LTE Uplink system

➤ CR Engine

The CR engine concept is MD-centric link selection based on ETSI RRS standardization

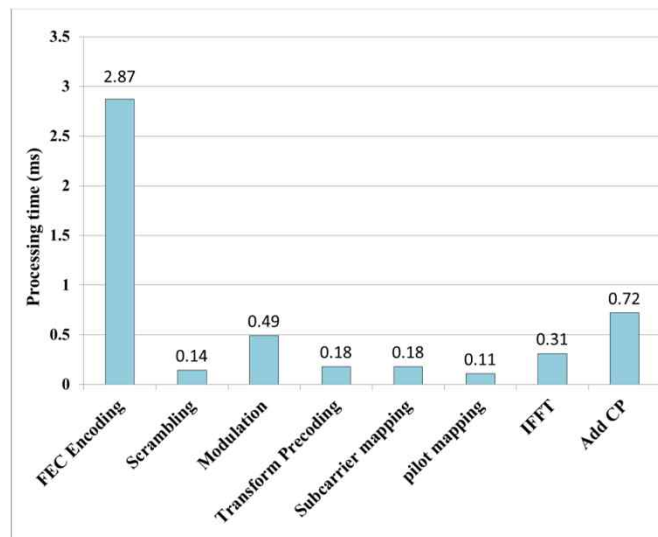




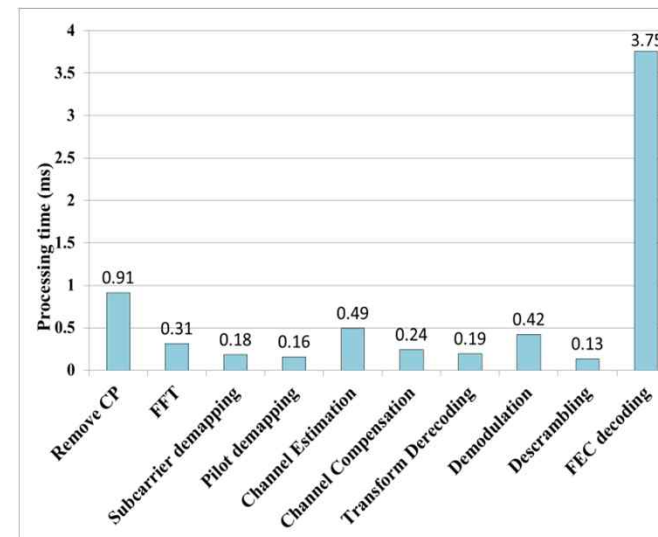
LTE Uplink System(2012)

Implementation of LTE Uplink system

Processing time of 1 LTE frame



Transmitter



Receiver

IV. Conclusion

Conclusion

- SDR base communication system has been hailed as an appropriate technology to 4G/Beyond-4G environment which aims at a convergence of various kinds of communication standards
- However, there is a limit on the amount of operations that can be supported by SDR system which only using CPU for baseband processing
- Applying the GPU-based parallel processing technology to the SDR communication system for 4G or even beyond-4G, we will be able to achieve extremely high operation speed and performance

