

# Introduction

## ❖ Topic

- Network time synchronization

## ❖ Team member

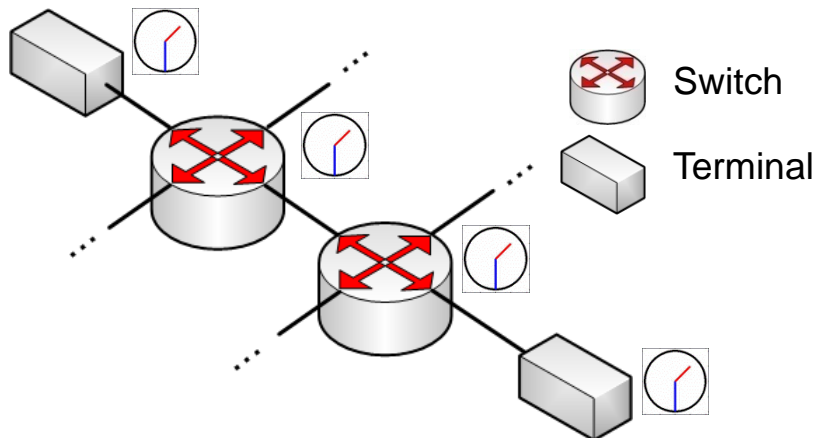
- Team member: C.K Seong and J.S Lim

## ❖ Sponsor

- Electronics Telecommunication Research Institute

## ❖ Goal

- High-precision time sharing between network nodes



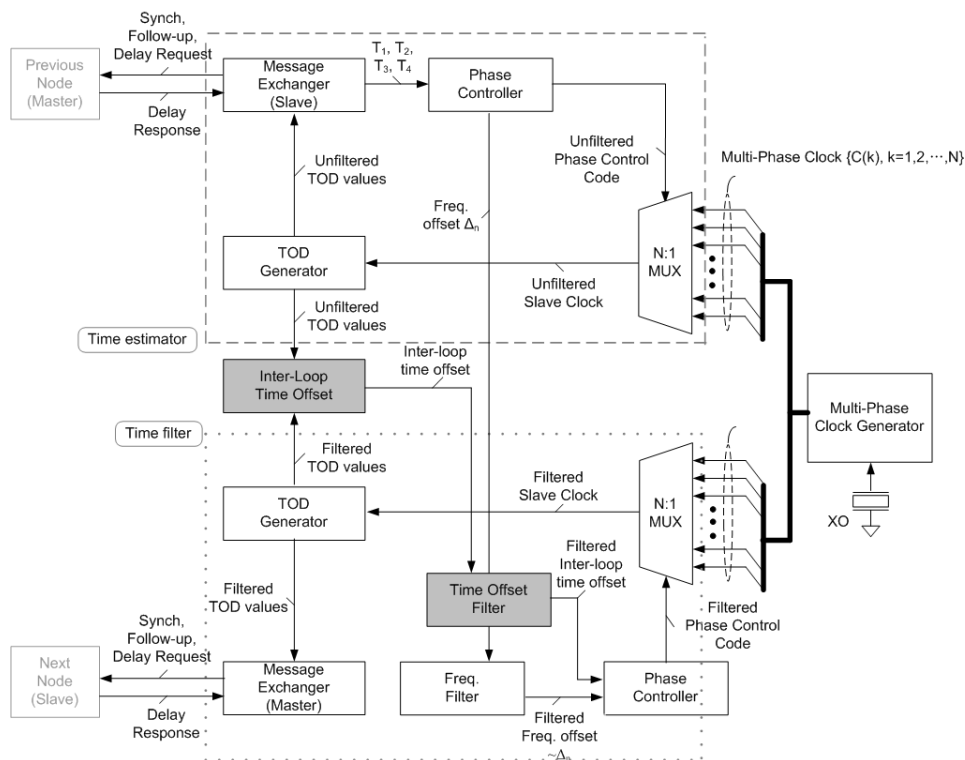
## ❖ Applications

- Ranging
- QoS improvement
- Manufacturing automation

# Research explanation

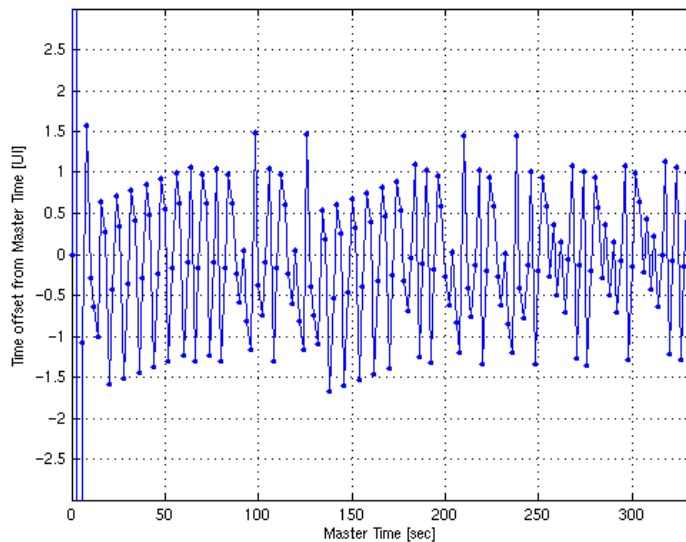
## ❖ Hardware structure

- Placed in slave nodes tracking the master node's time
- Time offset and rate adjustment using phase shift method
- Replica loop to filter out time offset dithering

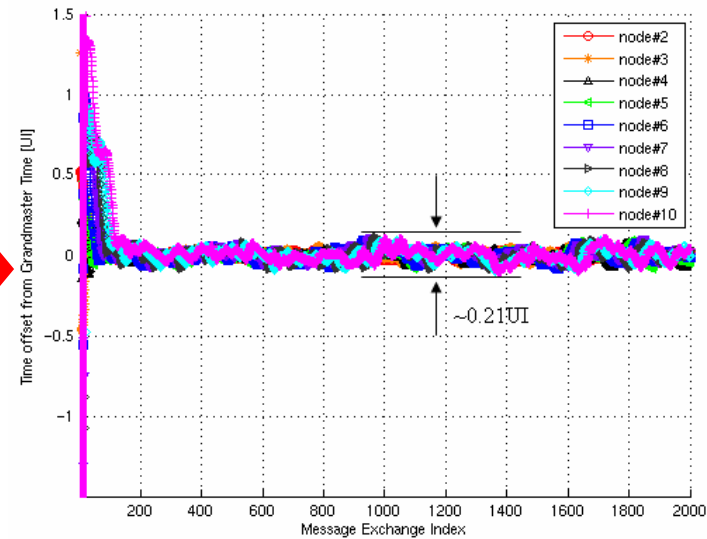


# Simulation and Experimental Results

- ❖ Behavioral simulation with Matlab model
  - Dithering of time offset in Loop #1 of  $\sim 3UI$
  - Dithering in Loop #2 reduced to  $\sim 0.21UI$



Time offset of Loop #1



Time offset of Loop #2

## ❖ Conference

- Chang-Kyung Seong, Seung-Woo Lee, and Woo-Young Choi, “Precise Network Synchronization Technique Using Phase Adjustment and External Filtering,” International Conference on Electronics, Information, and Communication, Tashkent, Uzbekistan, 24-26 June, 2008

## ❖ Patents (Pending)

- 이승우, 성창경, 최우영, 이범철, 이정희, 박대근, 황현용, 박영호, “클럭 동기화 장치 및 방법,” 출원인: 연세대학교 산학협력단, 한국전자통신연구원, 특허 출원번호: 10-2007-0130346, 출원일: 2007.12.13
- 이승우, 성창경, 최우영, 이범철, 이정희, 박대근, 황현용, 박영호, “클럭 동기화 장치 및 방법,” 출원인: 연세대학교 산학협력단, 한국전자통신연구원, 특허 출원번호: 10-2007-0135950, 출원일: 2007.12.22