Bandwidth Efficient Multimedia Communication Tools using Blackadder

Pub/sub Network Architecture

Xinghong Fang
Introduction

- Blackadder
  - Information-centric
  - The design of a network node
  - Efficient multicast
  - Flexibility in management (RV, TM)
  - Performance
  - No reliance on the IP stack
Aim of Study

- The benefit of going information-centric
- How to deploy a Blackadder network
- Comparison with CCNx
- Build a versatile communication tool
  - Support text/voice/video and push-to-talk
  - Working on devices with limited bandwidth (smartphones)
  - Adapting to bandwidth, stream auto on/off
  - Rapid video conference even with a large group of users (bandwidth consuming in IP)
  - Mobility support
  - Cross-platform support
Main Function

- **Rendezvous**
  - Match potential publishers and subscribers

- **Topology Management**
  - Management of the overall delivery topology
  - Transparent topology change

- **Forwarding**
  - Fast forwarding decision by AND/CMP operations
  - LIPSIN forwarding mechanism
Service Model

- publishScope(id, prefix, strategy)
- publishItem(...)
- unpublishScope(...)
- unpublishItem(...)
- publishData(id, strat, data)

Event
- NEW_SCOPE
- DEL_SCOPE
- ITEM_PUB
- ITEM_UNPUB
- START_PUB
- STOP_PUB
My Design

Information Structure
Experience gained

Advantages

● Clean API design
● Implicit multicast
● Security (Topology)
● Extensibility (Click!)

What is difficult

● Finding libraries for audio/video streaming
● Deploy the Blackadder network (with Android node)
● Thread handling with JNI
Compare to CCNx

**Blackadder**
1. Modularity of main functions
2. Optional security design decision leaves to upper layer
3. Flexible mobility support by updating FID in the background
4. Various deployment models (UDP, Eth, VPN, etc.)

**CCNx**
1. Routing information integrated with each nodes
2. Hard coded, mandatory encryption, lead to poor performance
3. No mobility support, location binded with naming
4. TCP/UDP (IP)

![Graph showing throughput vs. number of nodes]
Future works

● Implement audio/video function
● Evaluate the performance under heavy traffic load from video conferencing/streaming
● Improve thread handling
● Adding Dropbox like file syncing service over Blackadder