Bandwidth Efficient Multimedia Communication Tools using Blackadder

Pub/sub Network Architecture

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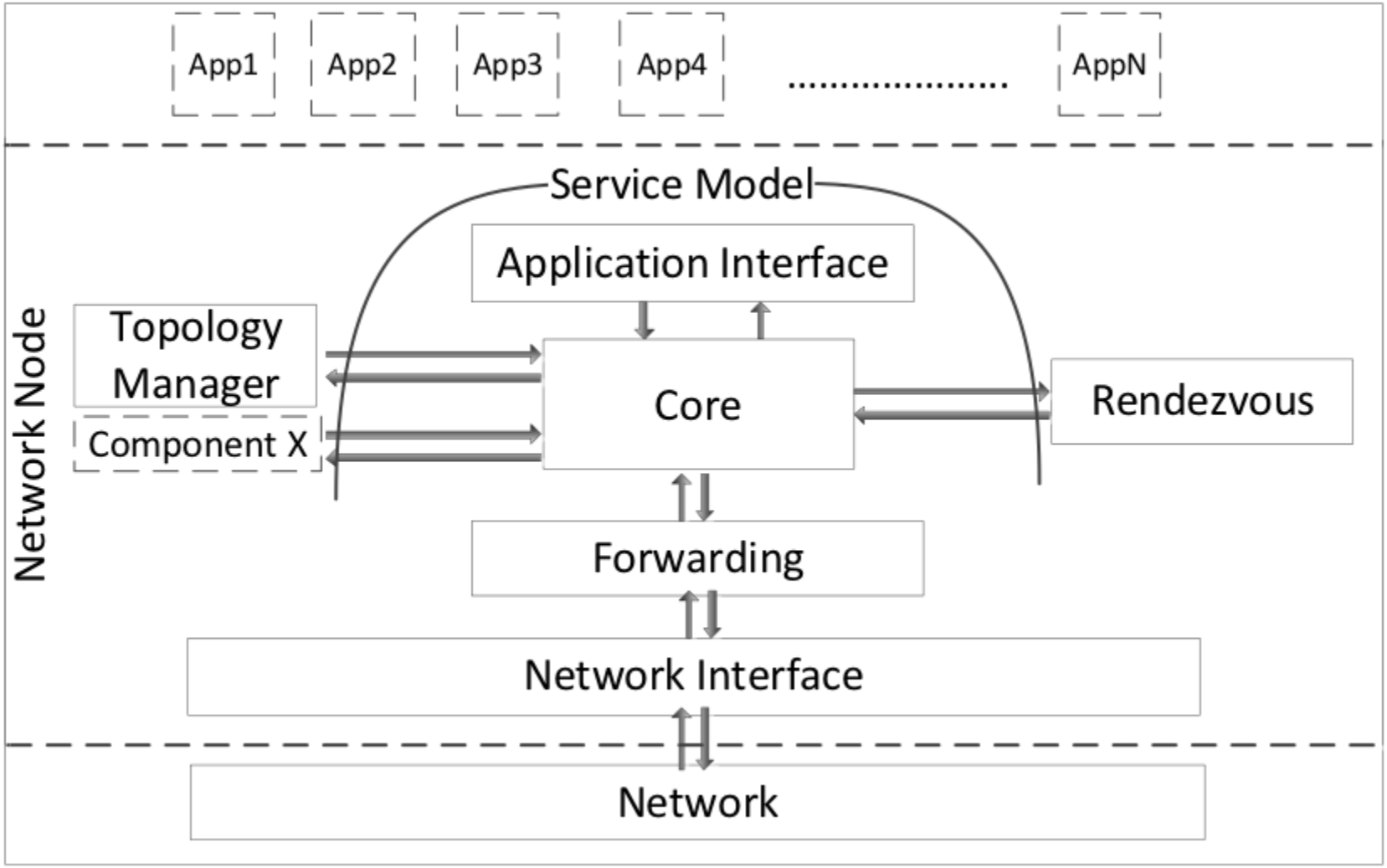
Introduction

- 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

Node Design


App1
App2
App3
App4
.....
AppN
Service Model
Application Interface
Network Node
Topology Manager
Component X
Core
Rendezvous
Forwarding
Network Interface
Network

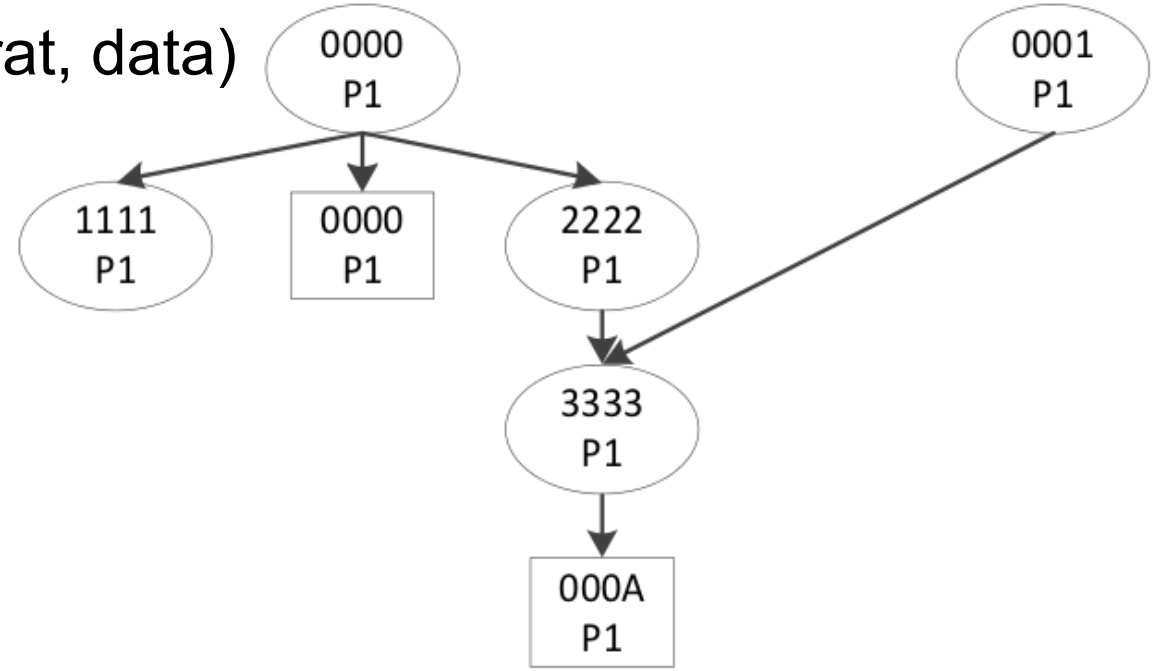
Main Function

- 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)
-

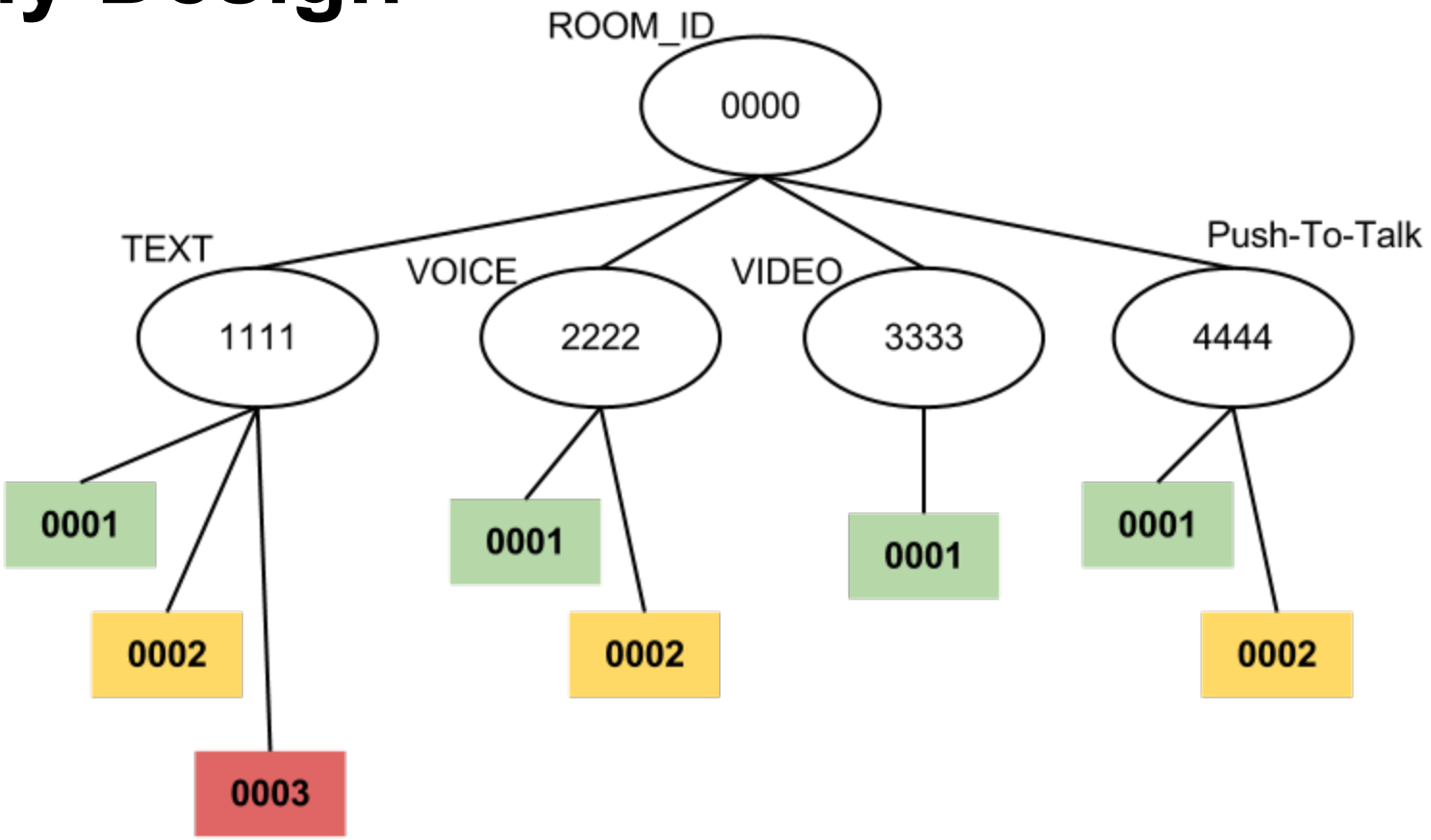
NODE_LOCAL
LINK_LOCAL
DOMAIN_LOCAL



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

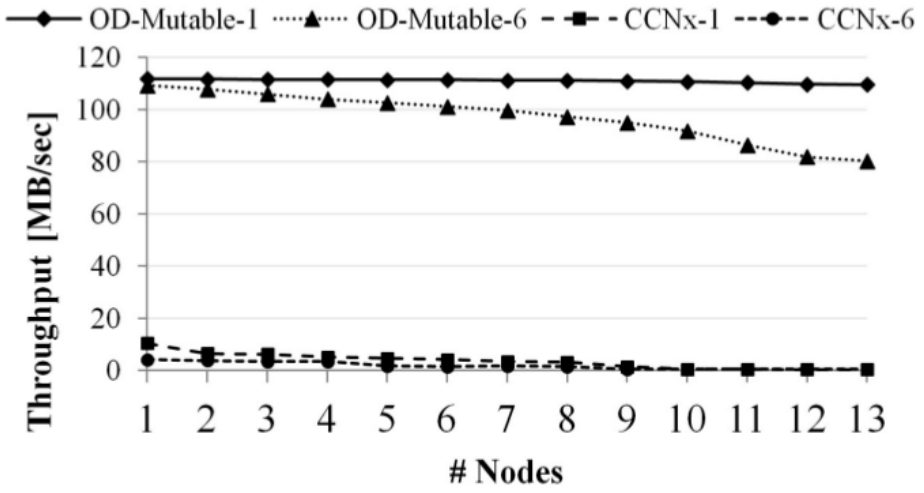
Compare to CCNx

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)



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