Analysis of the Evolved Multimedia Broadcast Multicast Service (eMBMS) in LTE Networks

www.sfu.ca/~atian/ensc427.html

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Roadmap

- Introduction
- Implementation
- Results & Analysis
- Conclusion & Discussion
- Future Work
- Reference
- Q & A
Introduction

- Long Term Evolution (LTE)
- Evolved Multimedia Broadcast Multicast service (eMBMS)
- Enables Single Frequency Network (SFN) broadcast capability within LTE
- Broadcasting Delivery same content efficiently to a large Number of user
Unicast VS Multicast/broadcast

- Unicast – users transmit and receive separately
  one to one transmission

- Multicast/Broadcast – all users receive simultaneously
  one to many transmission
Functionality

Flexibility to dimension unicast and broadcast. Identifying the right mix of services to keep subscribers interested.

Venue-specific Broadcast
Region-specific Broadcast
Nation-wide Broadcast

Example of LTE network resource TDM allocation

- Regular Hours
  - Unicast or On-Demand Content

- Game Time or Special Events
  - Broadcast Streaming
  - Unicast or On-Demand Content
  - 1/2 Carrier

- Night
  - Broadcast File Delivery
  - Unicast or On-Demand Content
  - 1/5 Carrier
  - 4/5 Carrier
eMBMs allows operators to control the service area to match audience

- Live event streaming
- Real-time TV streaming
- News, stock market report, weather, and sports updates
- Broadcast music and radio
- Off-peak media Delivery
Reuses LTE network infrastructures
Upto 60% of subframes can be allocated to eMBMS traffic
Broadcast over a single frequency network (MBSFN)
Efficiently broadcast delivery to a large Number of users
Cost Effective Upgrade of LTE Networks and Devices
Enable superior performance of high throughput and excellent coverage
Implementations

eMBMS architecture

UE: User Equipment
MCE: Multicell/Multicast Coordination Entity
MME: Mobility Management Entity
e-BM-SC: evolved Broadcast Multicast Service Center

http://www.researchgate.net/publication/257518275_Performance_Analysis_of_eMBMS_in_LTE_Dynamic_MBSFN_Areas
Implementations

- Scenarios: single cell, multi-users

2 UEs, Single Cell

20 UEs, Single Cell
Scenarios: multi-cell, with same number of users

20 UEs, 3 Cell
Results & Analysis

1. Single Cell, different # of users (Delay)
Results & Analysis

1. Single Cell, different # of users (Throughput)
Results & Analysis

2. Compare single and multi cells with 20 UEs (Delay)
Results & Analysis

2. Compare single and multi cells with 20 UEs (Throughput)
Conclusions & Discussion

1. At the same time point, the throughput increase as the number of UEs increase

2. With the same number of UEs, multi-cell improves the network performance
Problems & Difficulties

1. No “Wireless Network Deployment wizard”

2. The cell radius does not effect the network performance in OPNET LTE modeller

3. Need more determinable parameters to determine the throughput
Future Work

1. Study the throughput under different SNR
2. Study the effect of channel bandwidth to the throughput
References


Q & A

› Thank You