Prototype of Control and User plane splitting Heterogeneous Cellular Networks

KDDI R&D LABS, Panasonic, Osaka University, Tokyo Institute of Technology (JP)
Fraunhofer Heinrich-Hertz-Institut, Intel Mobile Communications, Commissariat à l’Energie Atomique, Orange Labs, Politechnico di Milano (EU)
Project website: http://www.miweba.eu/

**Concept & Architecture of C/U-splitting HetNet**

- **Background**
  - UHF, SHF, Millimeter-wave
  - Frequency: Traditional cellular bands (700MHz – 3.5GHz) vs. New frequency bands (6GHz – 70GHz)
  - Propagation Characteristics: Good for low penetration loss, Tricky for high penetration loss, Poor for heavily utilized, Rich for not utilized for mobile

- **Architectural alternatives**
  - **Single-RAT solution**
    - Unified architecture of LTE-Advanced (LTE-A) and Further enhanced LTE-A (including both licensed and license-assisted unlicensed spectrum)
  - **Multi-RAT solution**
    - Interworking between Multiple Radio Access Technologies (RATs)
      - LTE (-6GHz)
      - WiGig (-70GHz)

- **Get the advantages of both bands**

**Concept of C/U-splitting HetNet**

- Macro cell (Low frequency) + Small cell (Medium or High frequency)
  - Connectivity (for control)
  - Dense deployment (for user data)

- Control(C)-plane signaling vs. User(U)-plane data

**Prototype of C/U-splitting HetNet**

- **Development plan**
  - FY2013 (Finished)
    - MME/S-GW
    - Conventional BS
    - LTE Macro cell (2GHz)
    - LTE Small cell (3GHz)
  - FY2014-FY2015 (Under development)
    - LTE Small cell (3GHz)
    - ORI fronthaul with I/Q compression
    - C/U-splitting HetNet with LTE (2GHz/3GHz)

- **C/U-splitting HetNet using LTE**
  - Developed hardware
    - Parameter: Value
      - DL Carrier freq.: Macro: 2160MHz, Small: 3355MHz
      - DL bandwidth: 10MHz
      - Antenna conf.: 1x1 (SISO)
    - Radio access technology: LTE
  - Throughput test result while moving UE
    - UE receives the U-plane data from small cell, while keeping the C-plane handled by macro cell

**Architectural of MiWEBA prototype using LTE and WiGig (under development)**

- Macro eNB
- Serving GW
- Core Network
- Control Plane
- User Plane
- C/U-splitting within Centralized BBU
- Interworking between Multiple BBU

**ORI fronthaul concepts**

*HetNet: Heterogeneous Networks*