

Paper Review: SDN-Based Vs. Software-only EPC (Evolved Packet Core) Gateways – A Cost Analysis

BY

X. AN, W. KIESS (DOCOMO GERMANY)

J. VARGA, J. PRADE, H.J. MORPER, K. HOFFMAN (NOKIA RESEARCH)

Introduction



- **Evolved Packet Core (EPC) comprises of gateways like**
 - S-GW (Service Gateway)
 - P-GW (Packet Data Network Gateway)
 - MME (Mobility Management Element)
 - HSS (Home Subscriber Server)
 - PCRF (Policy Control and Charging Function)
- **NFV : concept of virtual EPC**

Challenges



- **Virtualization is difficult...**
- **Strong interaction between forwarding plane and control functions of the EPC**
- **Cost reductions from virtualization Vs. costs of additional transport and processing**

EPC functional entities

- **SDN allows separation of control plane (C-plane) from the data forwarding plane (U-plane)**
- **EPC's pure C-plane functions can be completely virtualized e.g. MME, HSS, PCRF**
- **EPC functions like S-GW, P-GW with strong C-plane and U-plane interaction pose a challenge**

NE+ approach



- **C-plane is separated from U-plane**
- **U-plane is handled with SDN switches (forwarding elements) and SDN controller**
- **GTP Tunneling and policy enforcement functions will need to be added to the FE (forwarding elements)**
- **10% overhead in traffic due to SDN signaling is assumed**

Gateway Virtualization Approaches



- **Fully virtualized approach – Software-only**
- **Partially virtualized – NE+**
 - **Aggregation switches (AG-S) can act as EPC gateway U-plane node**

Virtual EPC (vEPC) deployment aspects



- **Transport network topology including the location of AG-S**
- **Geographical placement of virtual EPC gateways**
- **Approach to gateway virtualization**

Transport network topology

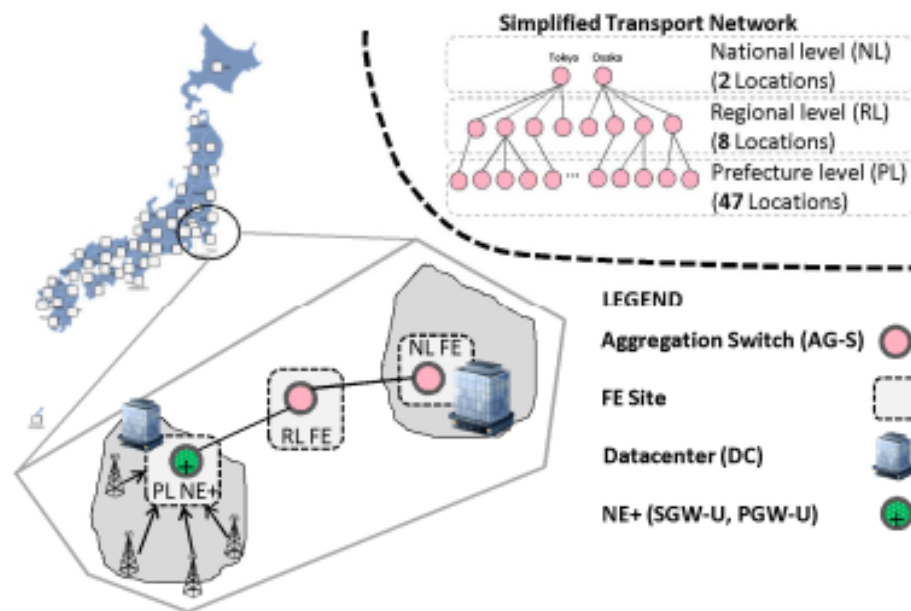


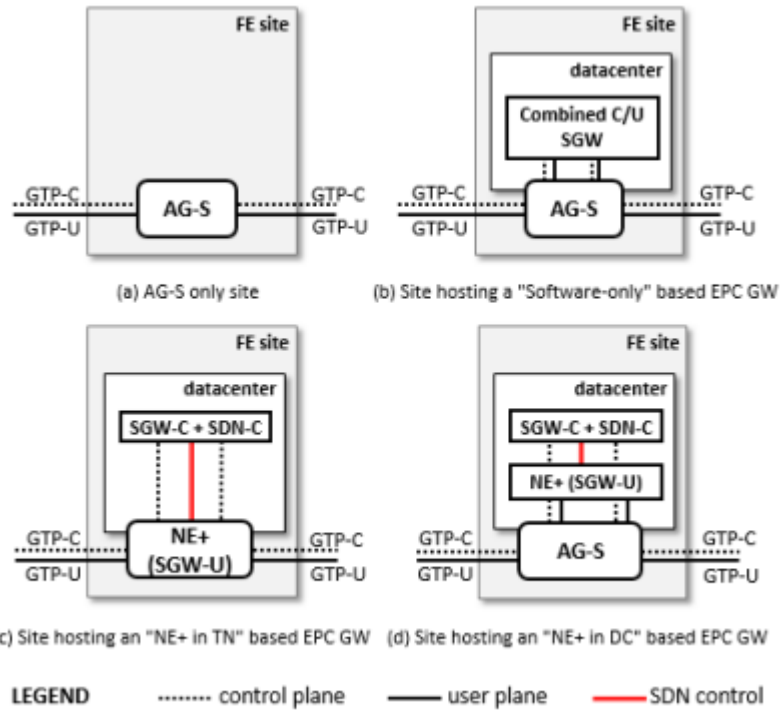
Fig. 1. Infrastructure of a scenario in a three level aggregation network

EPC deployment scenarios

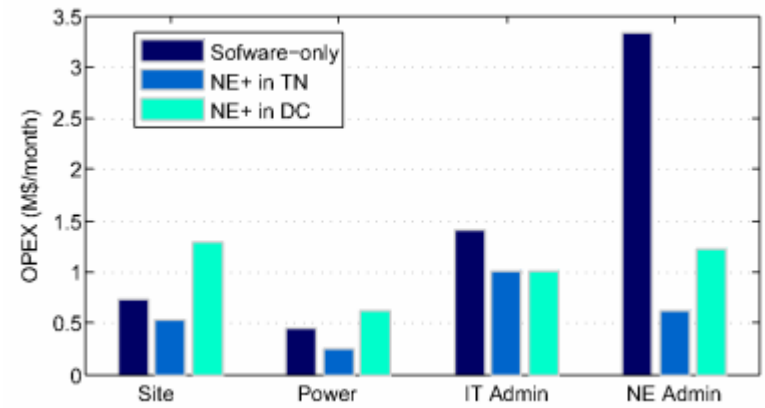
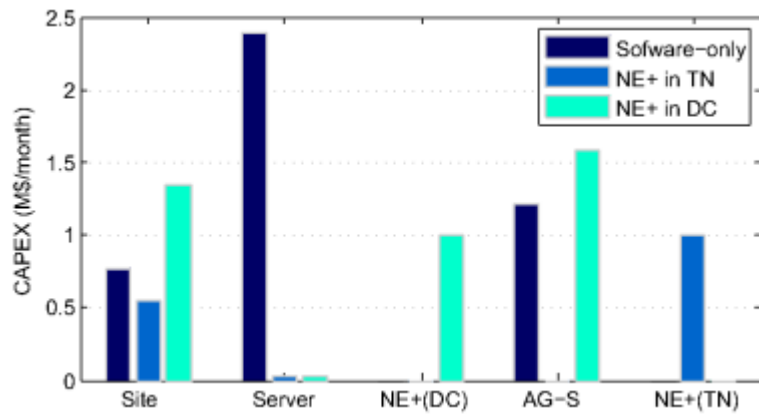


- **Software-only**
- **NE+ in TN**
- **NE+ in DC**

Continued...



Results



Continued...

