

KT's MPTCP Proxy Experiences

Deployment and testing considerations

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01 Introduction

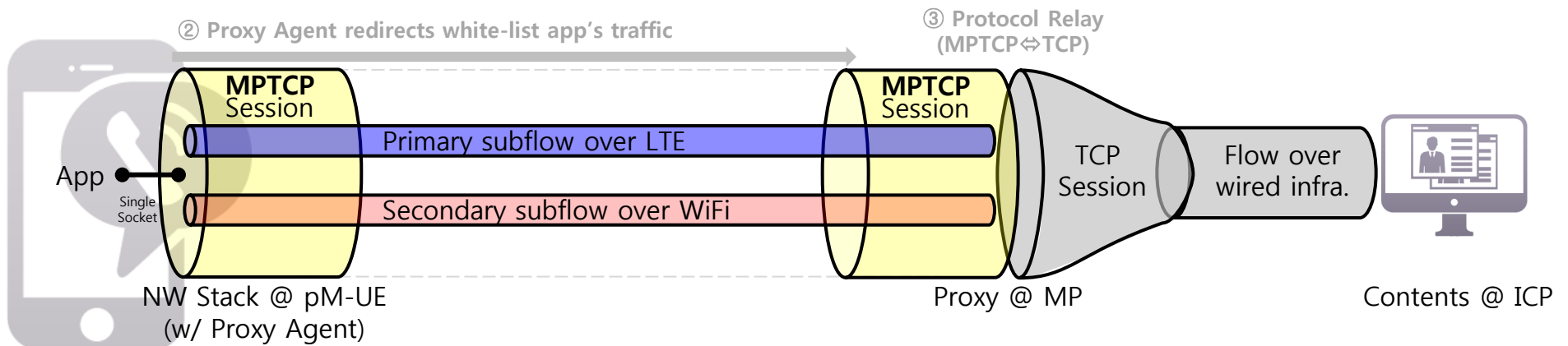
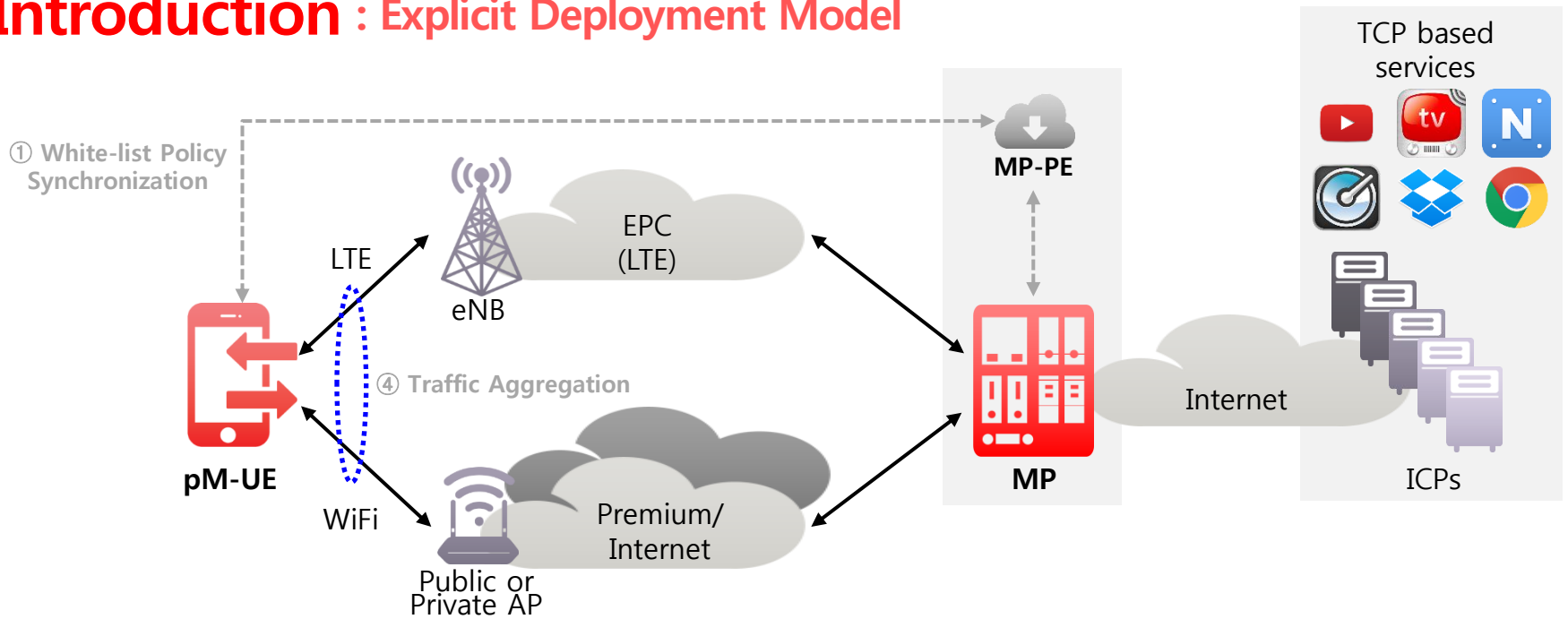
- **What we've done**

- Designed MPTCP proxy deployment model for Korea Telecom (operates national-wide LTE/3G and public WiFi)
- Implemented the proposed MPTCP proxy on x86 server
- Also, implemented UE solution with MPTCP kernel

- **KT's proposed MPTCP proxy deployment model**

- No touch on existing NW infrastructure: no modification or interworking with LTE EPC and wireline middle boxes
- Only the specific traffic from UE is routed to the proxy, other traffics flows through normal routing path
- We call it "Explicit MPTCP deployment model"

01 Introduction : Explicit Deployment Model



MP : MPTCP Proxy
MP-PE : MP-Policy Engine

pM-UE : MPTCP capable User Equipment w/ Proxy agent
ICP : Internet Content Provider

02 Main Features

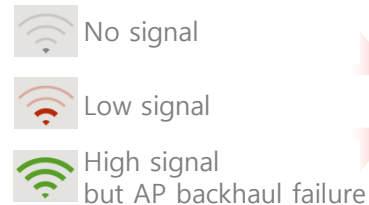
1 Mobile Throughput Enhancement

Aggregated connection provides higher throughput than LTE and WiFi single connection (both up and downward TCP-based services)

LTE + WiFi = **Aggregated Throughput** ↑

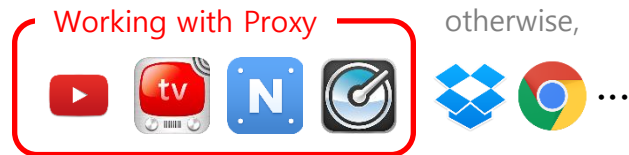
2 Robust when WiFi getting worse

Supplement path (LTE) still works when suffering from bad WiFi coverage, malfunctioned APs, etc



3 Operator-driven service options¹⁾

White-list : a group of services involved in MPTCP proxy by operator's selective provisioning



4 Service class differentiation²⁾

Available to adjust LTE-WiFi ratio according to subscribers' preference and their plan

Service classification   

Gold : speed ⇒ LTE+WiFi aggregation

Silver : savvy ⇒ Minimized LTE usage

Bronze : sensitive ⇒ WiFi-centric usage

General) GiGA Path provides WiFi automatic on/off functionality to white-list Apps

1) Development of terminal side white-list architecture is done, integration with MP-PE is under development

2) It may vary depending on business requirement, throttling based differentiation for subscribers' class is ready

03 MP OAM and pM-UE

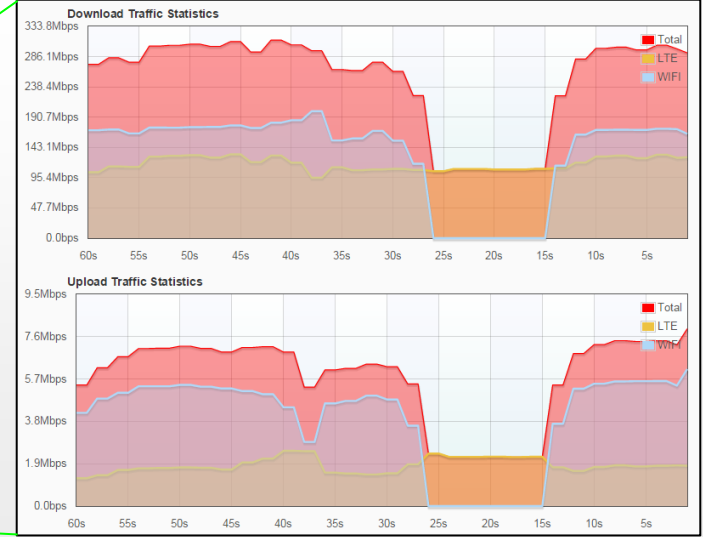
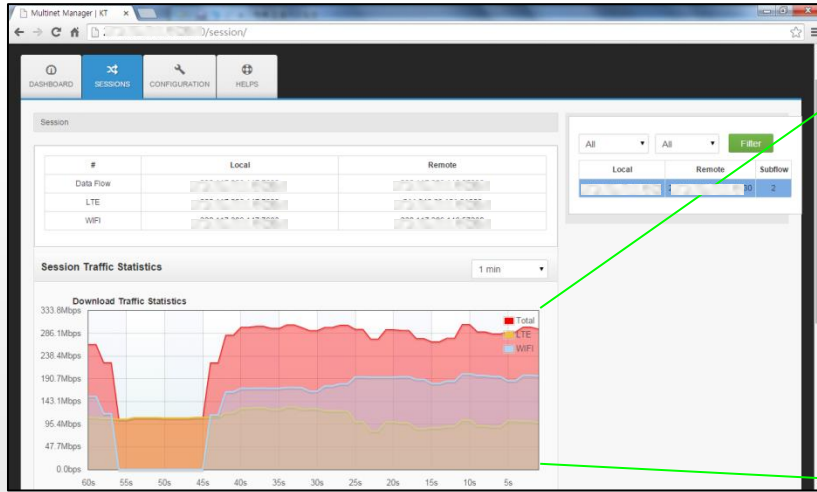


LTE+WiFi

LTE only

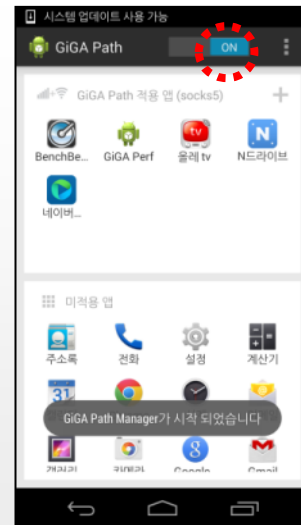
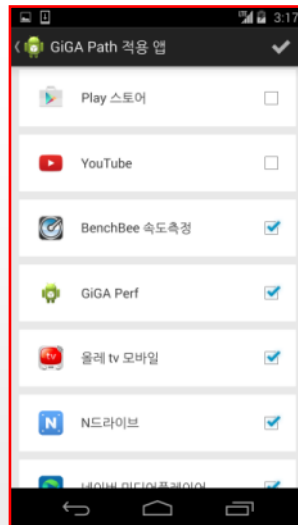
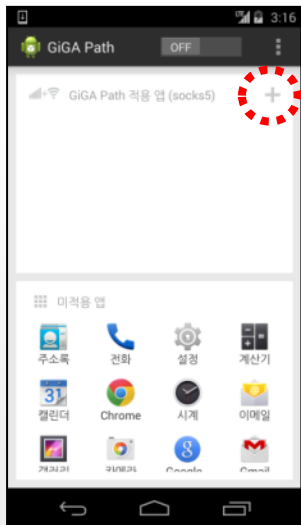
LTE+WiFi

MP OAM



※ 1GB HTTP get by using wget command at pM-UE

pM-UE



General UE (no modification)



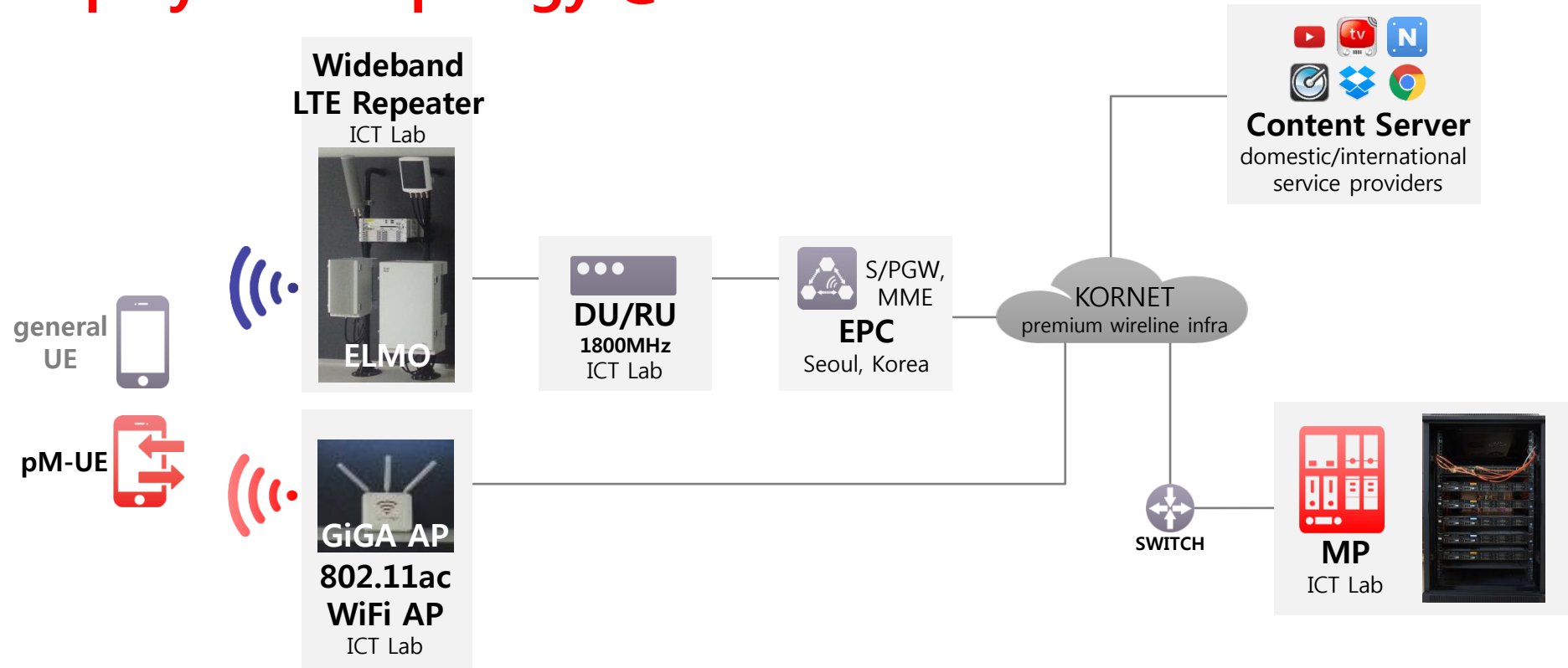
pM-UE

1) Run GiGA Path Mgr

2) White-list selection

3) Start GiGA Path service

04 Deployment topology @ commercial site



pM-UE (MPTCP capable UE w/ Proxy agent)



- Nexus 5 (Google's reference), etc
- MPTCP v0.86 (from UCL)
- GiGA Path Manager (KT's propriety)

※ include proxy agent and dual-interface functionality

MP (MPTCP Proxy)



- COTS x86 Server (HP DL380 Gen7)
- MPTCP v0.88 (from UCL)
- Proxy and protocol relay (SOCKS, http dual support)

05 Future work



Possible IETF work

- Participate in authoring internet draft for the explicit proxy model and/or MP-PE



Cooperation with terminal vendors for MPTCP support

- Requires common requirements within telecom operators



Stabilization of MPTCP kernel for Proxy architecture

- Minimize side effect on kernel against UE-driven proxy support



Thank you

