3GPP RAN Workshop on 5G
17-18 September 2015, Phoenix, USA

TAICS
Taiwan Association of Information and Communication Standards

Initiatives for 5G

Gabriel Lin
TAICS TC1 Chairman

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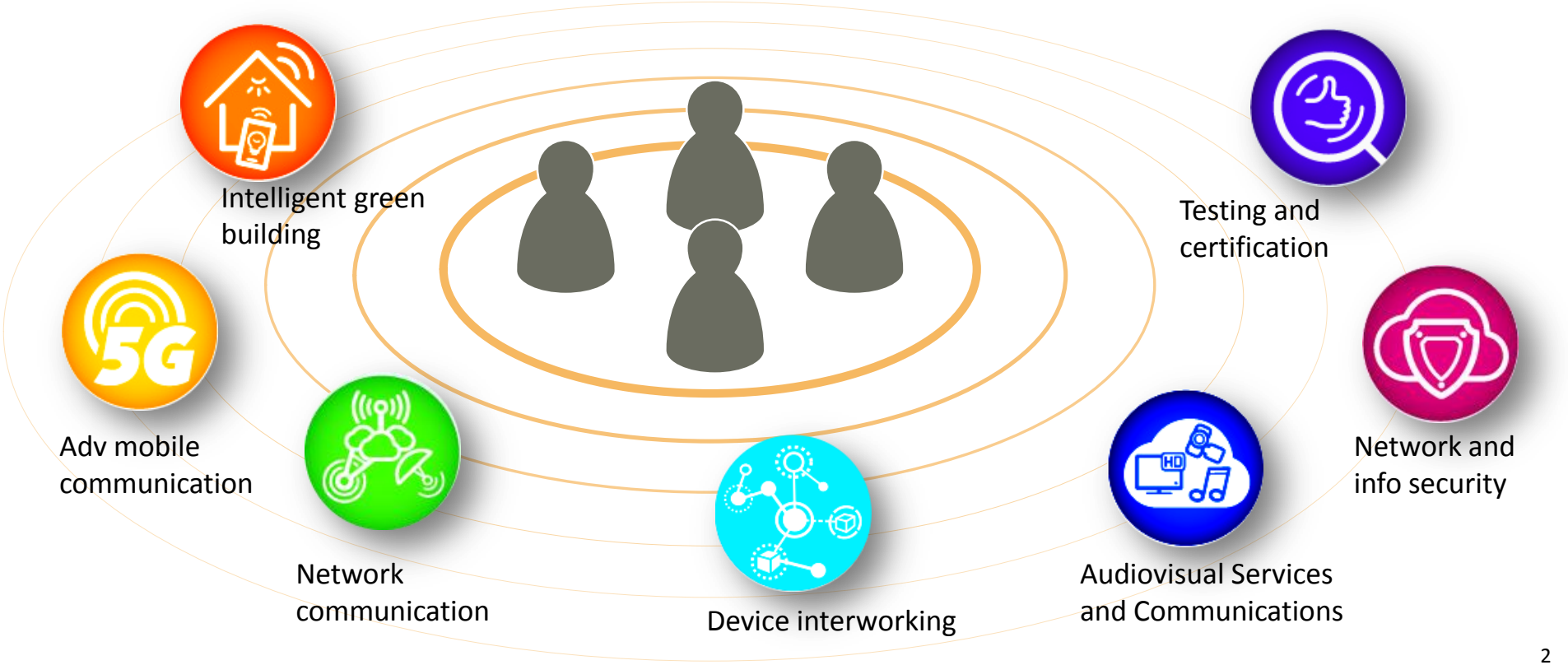
Founded early 2015

- Synergy among ICT stakeholders
- Collaboration with other SDOs



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82 Members and Growing

full eco system support

Chipset, component

MEDIATEK
REALTEK
康舒科技 Acbel Polytech Inc.
AIROHA 絡達科技股份有限公司
auden
M.gear
unitech
FOXLINK
翌勤通訊

Devices

acer
ASUS
FOXCONN
Inventec
Quanta Computer
htc quietly brilliant

Network vendors

Accton 智邦科技
arcadyan
BILLION
Bointec
D-Link
Gemtek
MitraStar 盟創科技
展連科技股份有限公司
WNC
TATUNG
ZyXEL
SERCOM
益昇智慧科技
宇創智慧 www.ucreation.com.tw
AIRTEK
amroad 安潤科技
通航國際 TONNET
遵宇科技 www.toughlink.com.tw
EVERSPRING
JOSEPHTEC
PEGATRON 和碩聯合科技
FUJITSU

Testing

BUREAU VERITAS
KEYSIGHT TECHNOLOGIES
ROHDE&SCHWARZ 台灣羅德史瓦茲有限公司
QuieTek 快特電波
世勝認證集團 Cerpass Group
ESBI 毅獅科技有限公司 ESBI Technology Inc.
iPE 儀寶電子股份有限公司 IPao Electronics Co., Ltd.
耕興股份有限公司 SPORTON INTERNATIONAL INC.
AIPT 亞信檢測科技
CGC
UL
台灣動力檢測

Operator

中華電信 Chunghwa Telecom
Taiwan Mobile 台灣大哥大

Content

TREND MICRO
RayAegis Information Security
ONWARD SECURITY
DEVCORE Security Consulting
eASPNet
華沿傳播
Inwellcom.Tech.co.
JSIG建伸智慧綠建築有限公司 Jian Shen Intelligent & Green Building Co., Ltd
中興保全 SECOM
IRONYUN
ELTA TV 愛爾達電視
Hwacom 華電聯網
kbro
龍華數位媒體科技
高瞻資訊 Moremote www.moremote.com
TVBS
asusCLOUD
DELTAMAC
台數科 Taiwan Optical Platform
創益科技顧問股份有限公司 Innova Tech & Management Consultant, Inc.

Research Institute

工業技術研究院 Industrial Technology Research Institute
財團法人資訊工業策進會 INSTITUTE FOR INFORMATION INDUSTRY
國家中山科學研究院
AIEP
國立中正大學 National Chung Cheng University
DTVC
STBA
台灣智慧建築協會 http://www.tiba.org.tw/ Taiwan Intelligent Building Association
國立交通大學
CISA
ETC

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Taiwan 5G Whitepaper

diverse applications, all things connected

Tablets

Smartphones

Wearables

Sensors

Smart homes

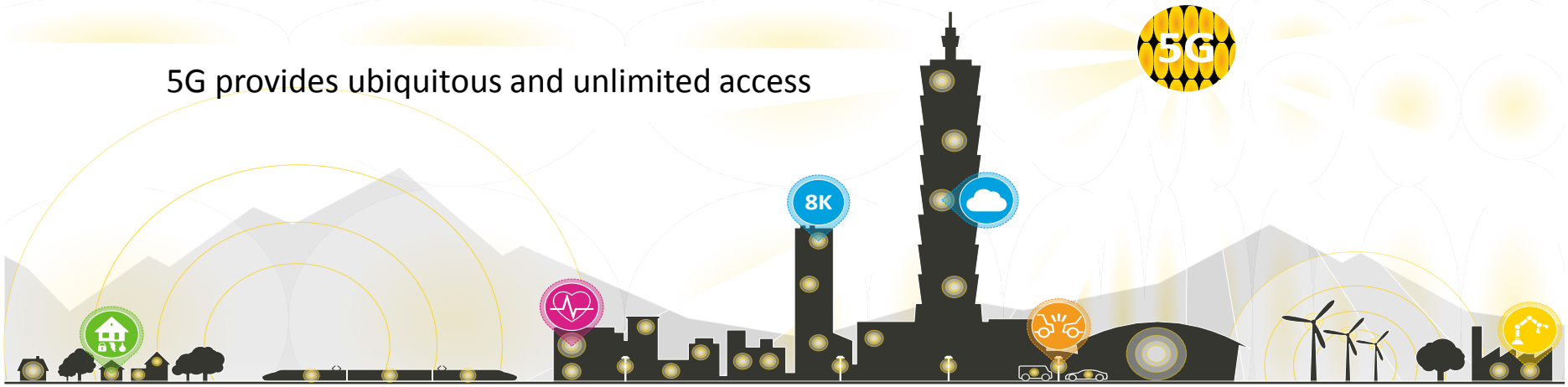
Health

Automotive

Automation

Cloud services

5G provides ubiquitous and unlimited access



Extended coverage | Wide area | High speed | Residential | Office | Dense urban | Automotive | Crowd | Energy | Industry

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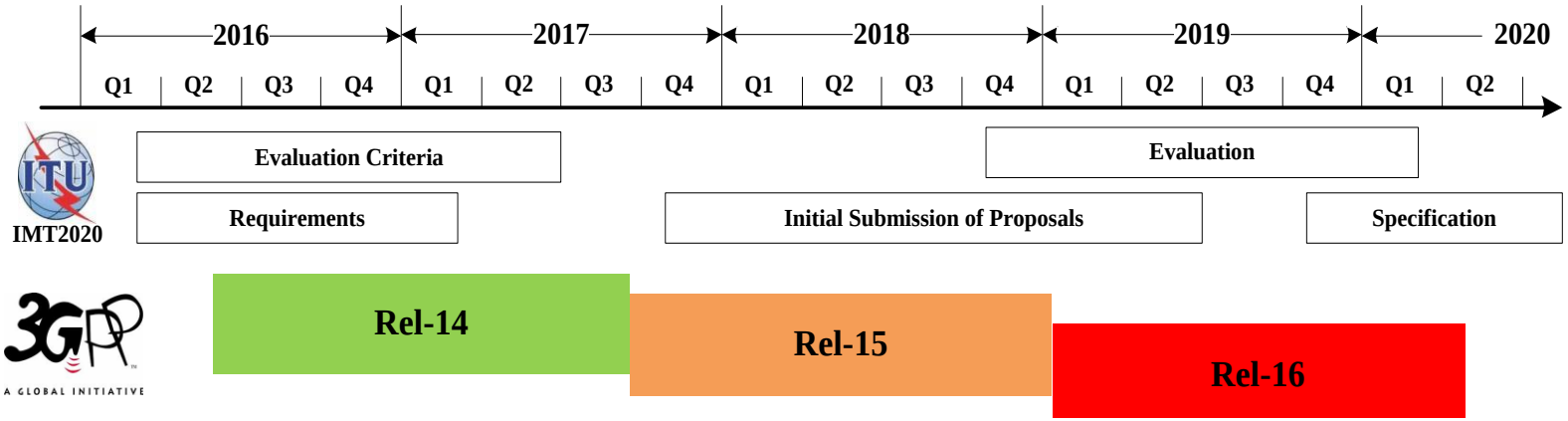
5G Standardization

phasing with priority

- **3GPP plays the leading role in 5G standardization**
  - **TAICS members assume three releases Rel-14, 15, and 16**
  - **Market demand should dictate the priority**
    - Technologies required for 2020 deployment should be prioritized in Rel-14 and Rel-15



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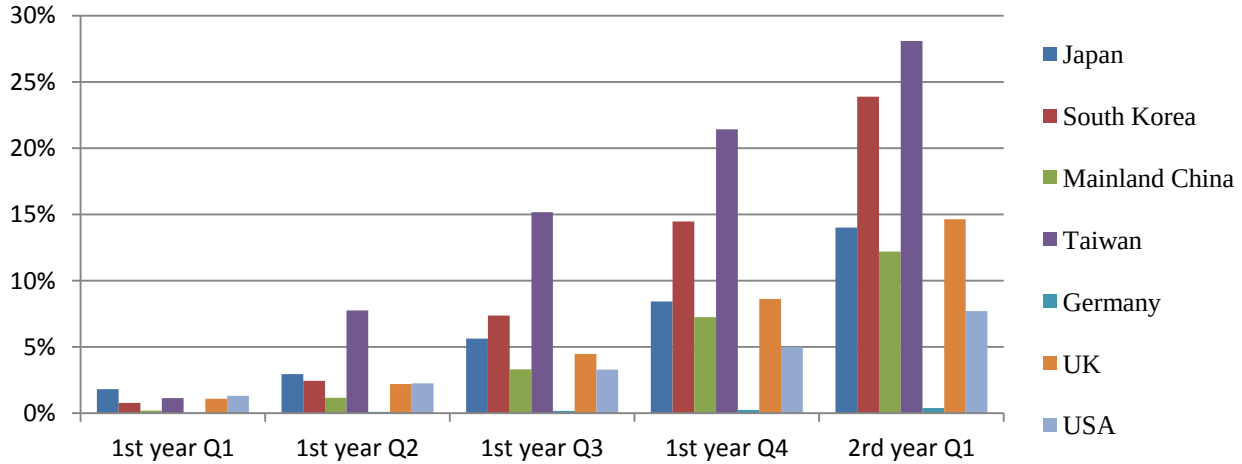
Mobile Broadband in Taiwan

a rich environment to explore

	Data Traffic (GB/user/month)		Data Traffic (GB/user/month)
Japan	3~4	Germany	< 1
South Korea	3~4	UK	1~2
Mainland China	< 1	USA	2~3
Taiwan	7~10	Global Average	1~2

Average data usage by LTE subscriber per month



LTE market penetration in the first 5 quarters after commercial launch

Source: GSMA Intelligence, 2015/Q2

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5G Acceleration Program

$500M by Executive Yuan

加速行動寬頻服務及產業發展方案

- **1.加速行動寬頻網路佈建**
  通傳會 (NCC)
  - 1.1 加速無線寬頻網路基礎建設暨電磁波宣導
  - 1.2 推動共構共站行動通訊平台
  - 1.3 建置新世代電波監測系統
  - 1.4 前瞻性頻譜規劃
- **2.行動寬頻創新應用服務**
  經濟部 (MOEA)
  - 2.1 建置4G+ 網路接取與應用測試環境
  - 2.2 豐富4G內容服務與創新應用
  - 2.3 發展4G先進商務模式
  - 2.4 構建4G智慧寬頻應用城市
- **3. 消費者權益保障**
  通傳會 (NCC)
  - 3.1 提升4G網路服務品質
  - 3.2 資安檢測及認證
  - 3.3 永續環境建置
  - 3.4 公益應用服務
- **4. 行動寬頻技術發展**
  經濟部、科技部 (MOEA, MOST)
  - 4.1 研發行動寬頻新興技術
  - 4.2 穿戴式裝置小蘋果園
  - 4.3 下世代前瞻技術開發與應用
- **5. 行動寬頻尖端技術人才培育**
  教育部 (MOE)
  - 5.1 跨校教學能量建構
  - 5.2 尖端技術實作與創新環境建置
  - 5.3 國際交流接軌

Trial Network

New Applications

New Technology

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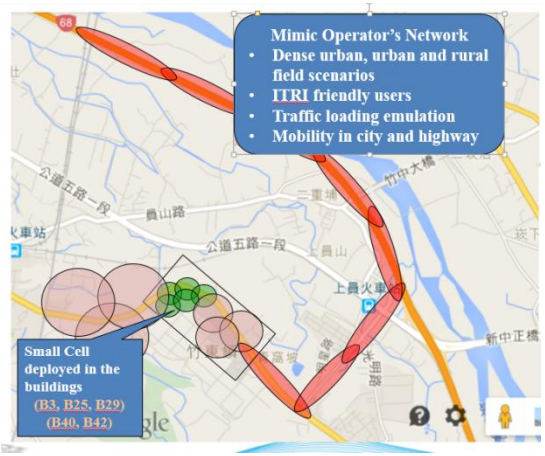
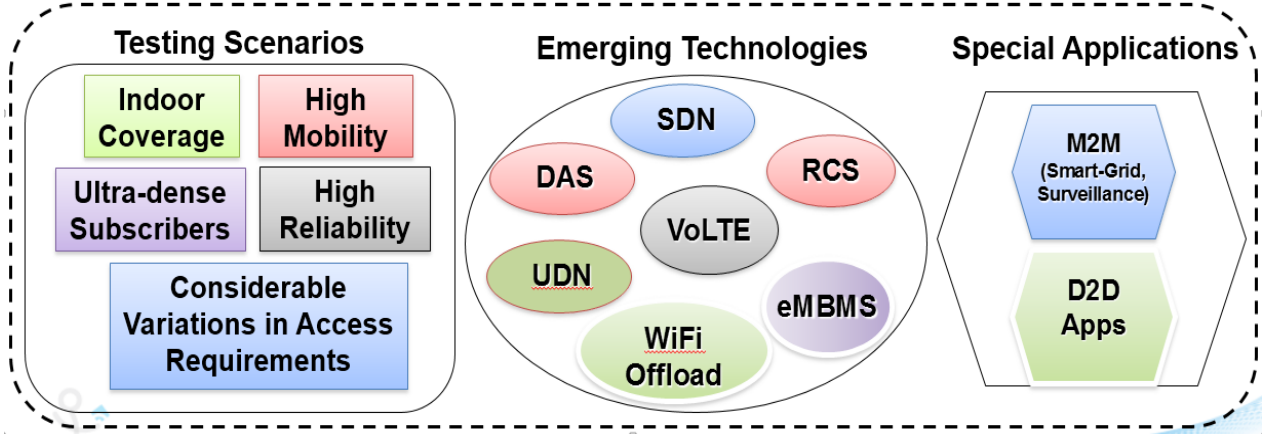
5G Trial Networks





2014 Network Planning	2015 Network Deployment	2016 HetNet Development	2017 B4G/5G Test Bed
• 4G+ trial network planning • FDD/TDD converged field trial	• Multi-vendors, multi-band, multi-mode • Small cells with SON	• Evolve towards SDN/NFV Core • Integrate LTE and WiFi networks	• Support B4G/5G technologies evaluation and verification • Enable D2D, IoT applications field test

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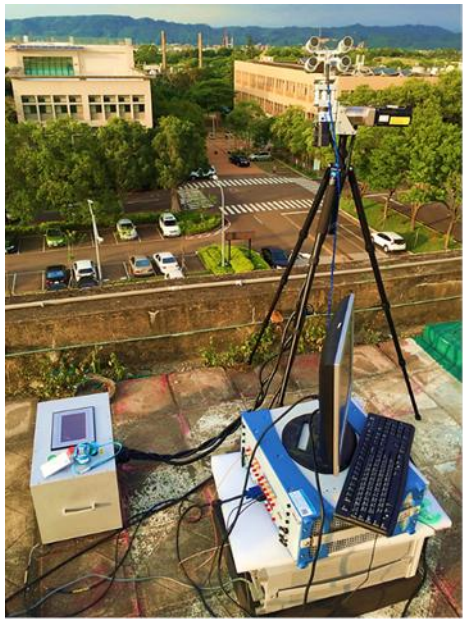
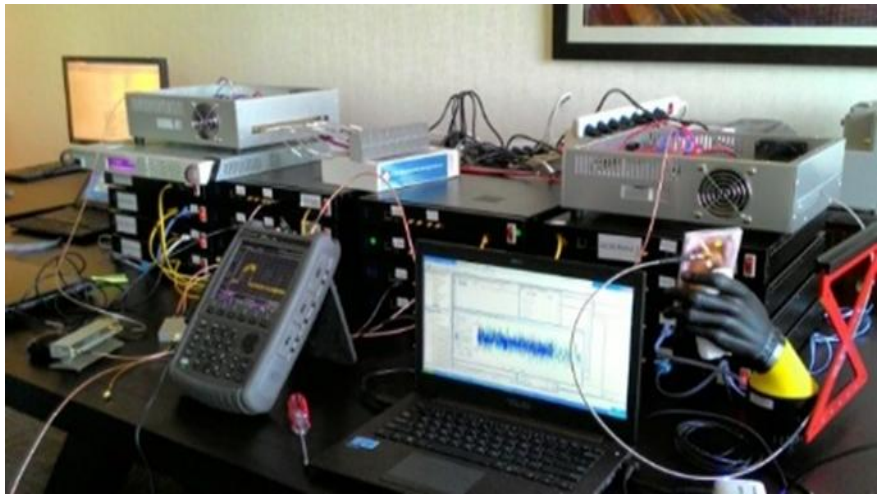
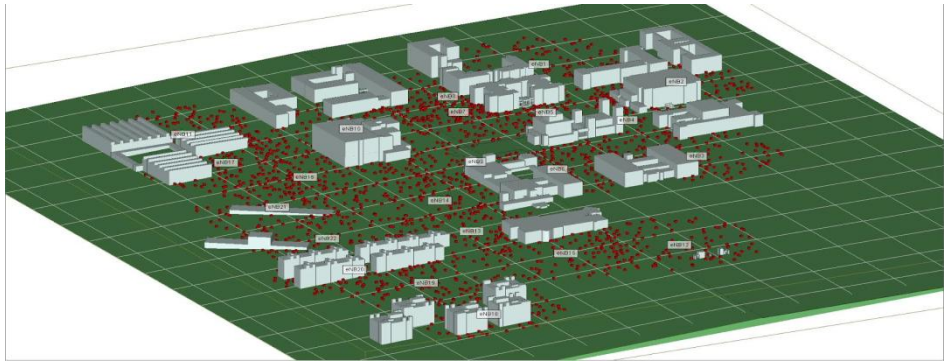
Exploring mmW

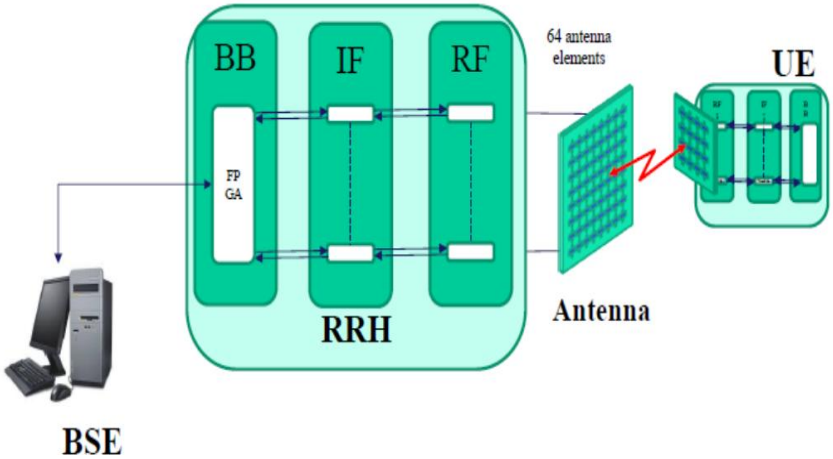
Channel measurement & modeling

Gbps demo Globecomm-2014 mmW testbed



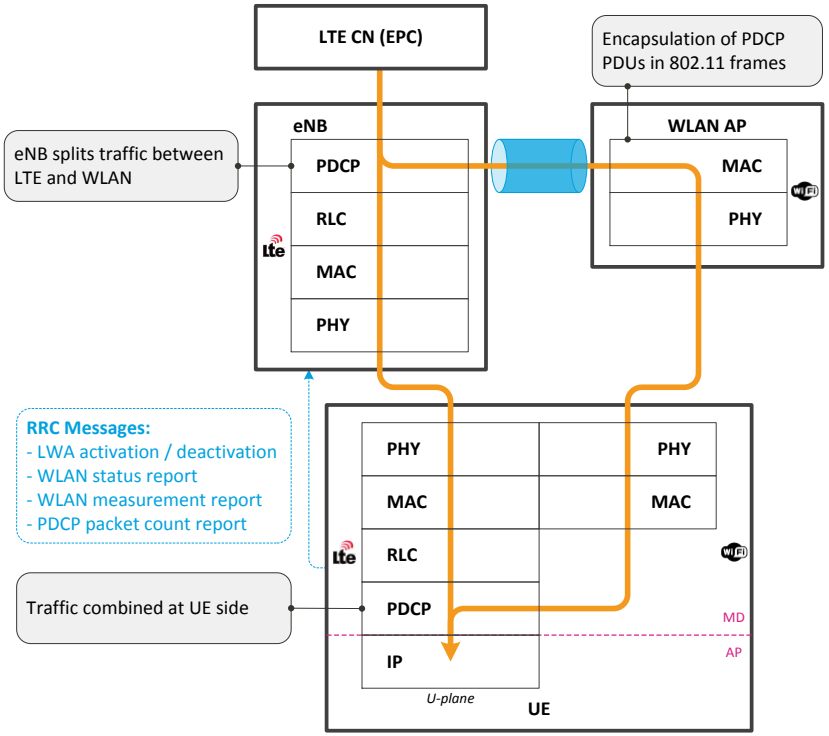






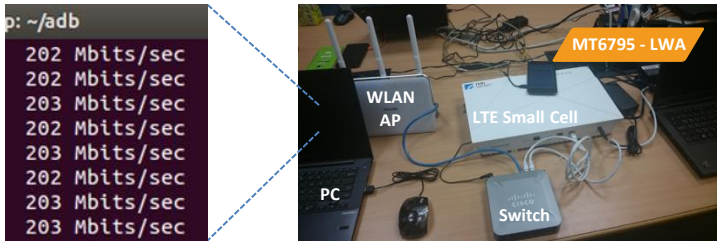
LTE / WiFi Aggregation

- Solution



- Prototype testbed

RAT	Configuration
LTE	-TDD mode with configuration 4 -10MHz @B40 -Transmission mode 3 -RLC UM mode
WLAN	-802.11ac 40MHz in 5 GHz band -eNB and WLAN AP connected via L2 -No change to WLAN AP



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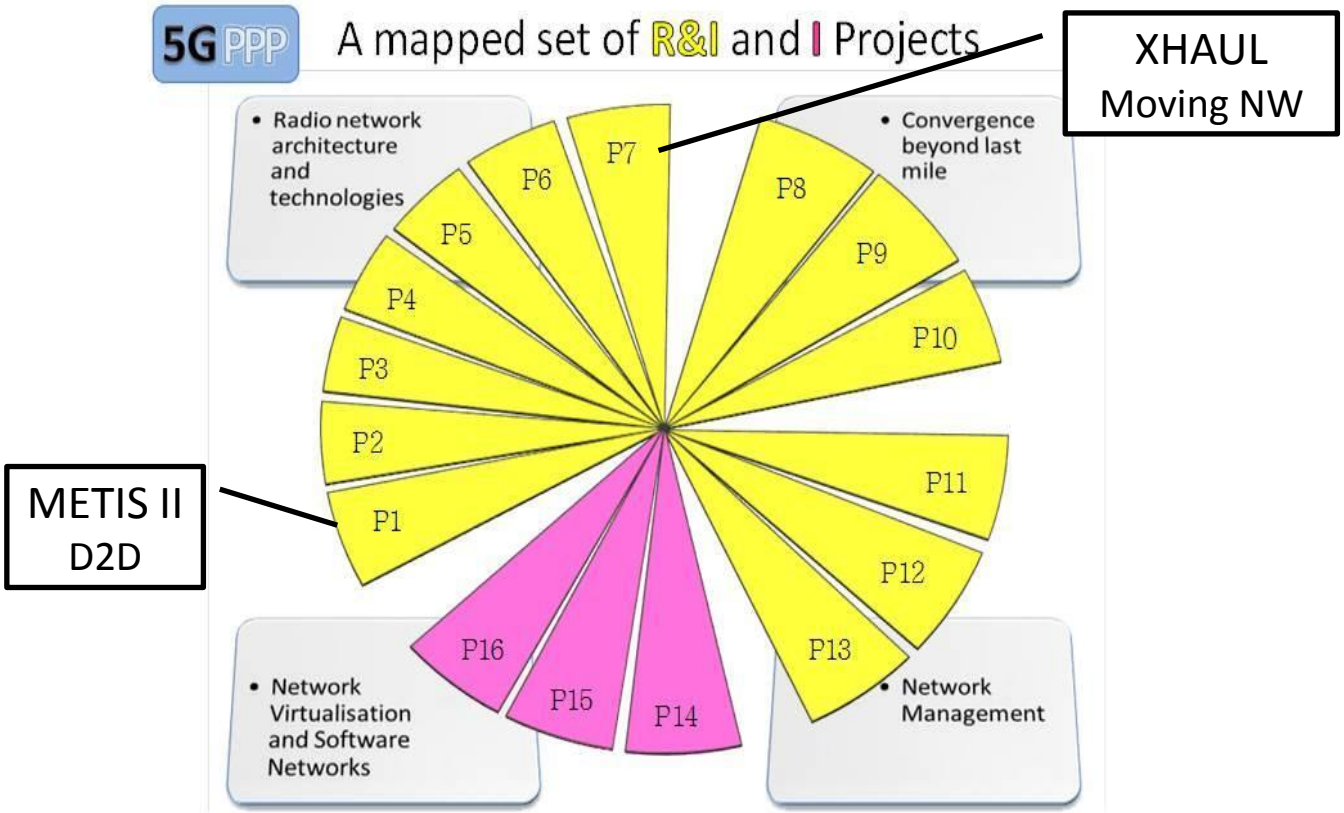
EU-Taiwan 2015

H2020 5GPPP ICT-14: Consortium members in METIS II (P1) and Xhaul (P7)



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EU-Taiwan 2016-2017

H2020 2016-17 Targeted Opening Call
EU-TW Cooperation in access convergence
(5 million Euros each side)

European Commission

DIGITAL AGENDA FOR EUROPE
A Europe 2020 Initiative

Taiwan

EU-Taiwan 5G Collaboration

Location: INCO village

EU-TW Targeted Opening call~ 5G PPP Access Convergence: ICT3.2 – 2016: Integration of different air interface technologies and the fronthaul/backhaul/core network, in lab or in a testbed, to demonstrate the capabilities of new spectrum schemes when co-working with the network. A system with applications is strongly encouraged, e.g. for high speed moving vehicles"

ITRI
Industrial Technology Research Institute

Dominating ICT box making, Taiwan has been a major force in driving down costs of CPE & 3G/4G handset ODM/OEM.

The Industrial Technology Research Institute (ITRI), together with Taiwan's world renowned ICT manufacturers, will be strong contributors in 5G development & fast prototyping with its operator-tested small cells, D2D/M2M solution, and mobile communication experiments on fast-moving vehicles/high speed rail (300 Km/hr) with 2-hop architecture & Radio over Fibre solution.

The Taiwan stand will showcase test beds with integrated access across different air interface technologies & fronthaul/backhaul/core network.

- Providing facilities for 5G demonstration
- Seeking partners
  - V2V
  - M2M
  - 5G channel modeling & simulation
  - UDN
  - Xhaul Continuation

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Conclusion

Workshop

Alliance

Trials

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website *www.taics.org.tw*

TAICS members contributed:

Acer, ASUSTeK, CCU, Chunghwa Telecom, Foxconn, III, ITRI, MediaTek, Taiwan Mobile