

Smart Factory Joint Workshop 5G Forum & 5G ACIA

5G Standardization in TTA : Vertical service standardization

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Table of Contents

I	Global Standardization Status
II	Vertical Standardization in TTA
III	TTA SPG35

I

Global Standardization Status

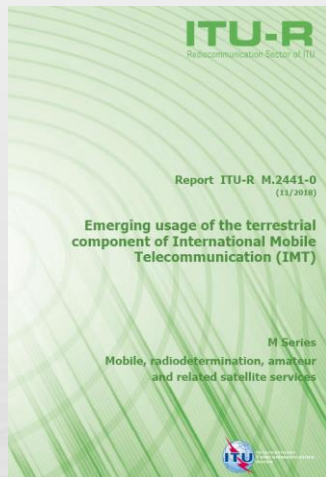
5G Service Scenario (ITU & 3GPP)

IMT-2020 Requirement (Service Scenario)	3GPP 5G Tech. Standard		
	Release 15 NSA (17.12)	Release 15 SA (Phase 1 - '18.6)	Release 16 (Phase 2 - '20.3)
eMBB Data rate: 20Gbps(DL)/ User Experience Data rate: 100Mbps(DL)	Enhancement of data rate (LTE + 5G)  4K/8K UHD	5G Standalone Network VR/AR Hologram	Enhancement of 5G system  Various eMBB / Real-time service
URLLC Reliability: 1-10 ⁻⁵ (100 bytes) Delay: 1ms		Meet the ITU-R requirement (NR based) C-V2X basic Safety Service (LTE based)	Meet the 5G vertical requirement Advanced V2X Remote control
mMTC 10 ⁶ device/km ²		NB-IoT/eMTC 이용 (LTE based)  eMTC Cat-M1 NB-IoT Cat-NB1	Smart City  5G Based Industrial IoT (IIoT) 

5G Vertical Standardization (ITU-R WP5D)

❖ ITU-R WP5D, Report ITU-R M.2441 (2016.6~2018.11)

- Compilation document on **existing and new usage of IMT** in specific applications.
- It introduces potential new emerging applications of IMT in areas beyond traditional voice, data and entertainment type communications.
- It is provided as a reference document on these important uses of IMT, as **envisaged in the vision for IMT-2020**.



< New usage of IMT in ITU-R M.2441 (e.g. Wearable, eHealth, etc.) >

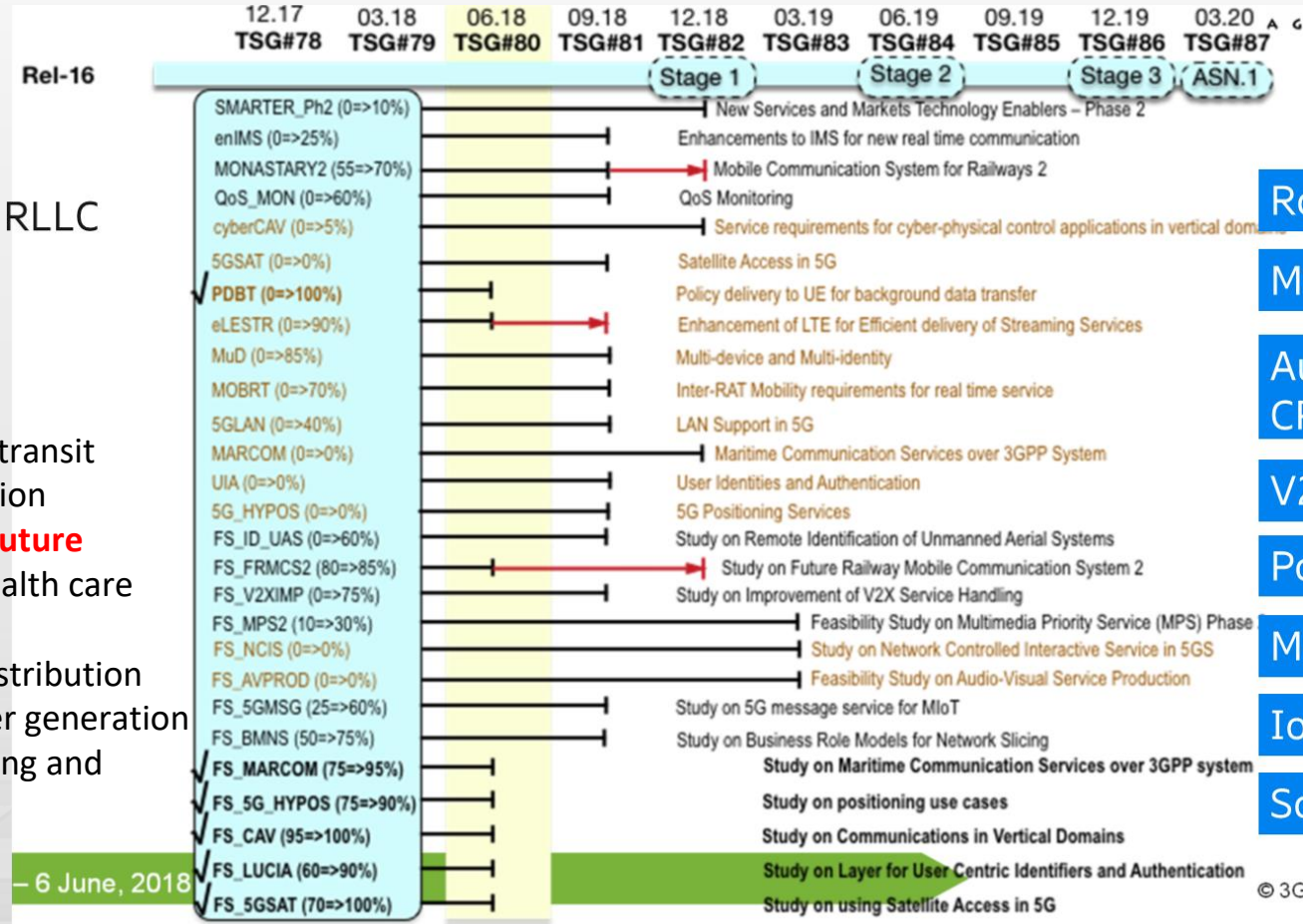
- ❖ ITU-R WP 5D consider a **new potential ITU-R Resolution and/or Question** in the light of the recent ICT environment (expand into new market segments to facilitate the digital economy) based on IMT.

5G Vertical Standardization (3GPP – Vertical Requirement)

SMARTER
 → Enablers for
 eMBB, mMTC, URLLC
 (22.861-4)

< 5G Automation >

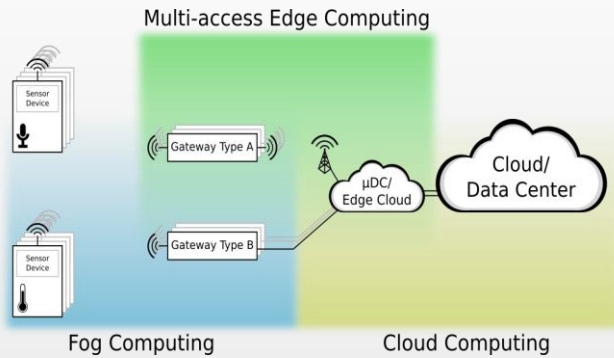
- Rail-bound mass transit
- Building automation
- **Factories of the future**
- Smart Living – Health care
- Smart city
- Electric-power distribution
- Centralized power generation
- Programme Making and special event
- Smart farming



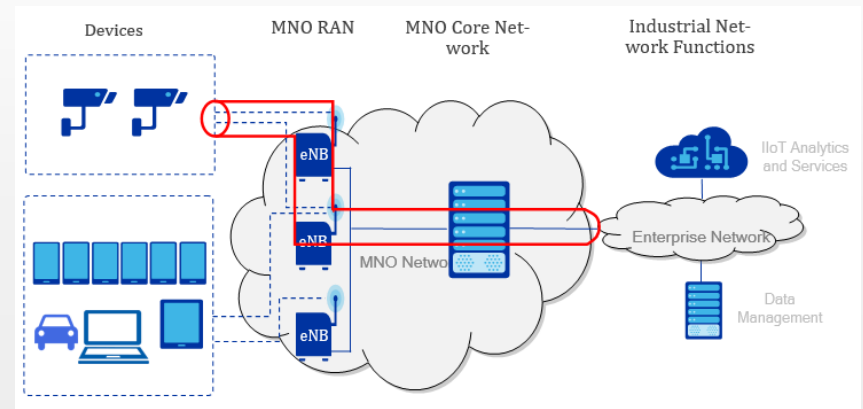
- Railways
- Maritime
- Automation, CPS
- V2X
- Positioning
- Media
- IoT
- Satellite

3GPP TR 22.804
 + 22.821, 22.862

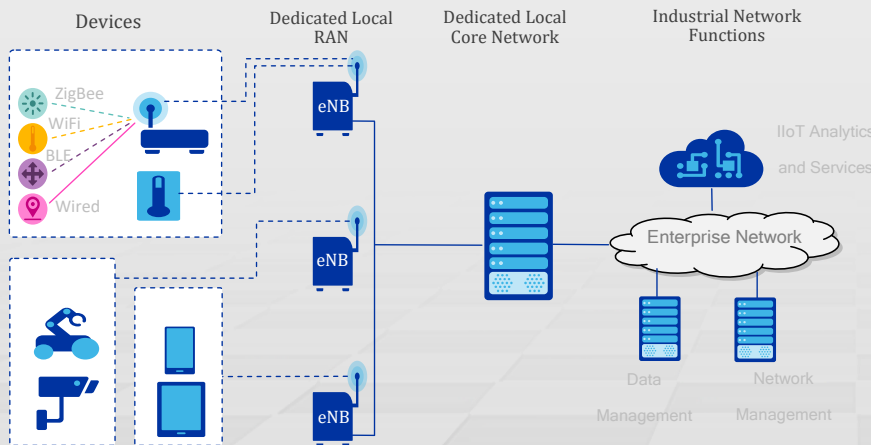
5G Vertical Standardization (3GPP – Automation)



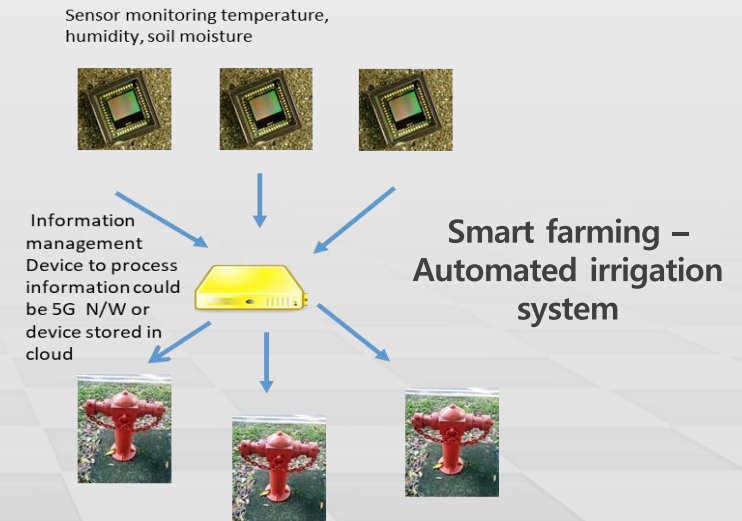
**Factories of the Future –
Massive wireless sensor networks**



Smart City - Dedicated, sliced public wide-area network for industrial automation



**Factories of the future –
using a dedicated local type-b network for industrial automation**



TR 22.804 (v16.1.0) Study on Communication for Automation in Vertical Domains

5G Vertical Standardization (3GPP – Factory)

❖ Smart Factory Standardization in Release 16

- **5G based Time-Sensitivity Networking (TSN) to improve the established (wired) Industrial Ethernet solutions**
- **Consider the non-public network for 5G**

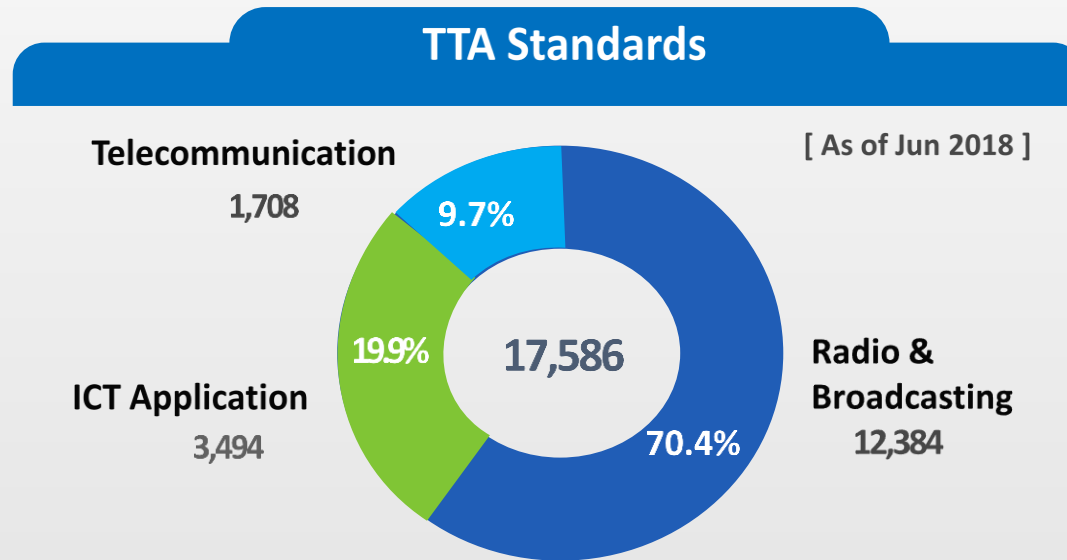
Acronym	Name	Start Date	Finish Date	Complete
-	5GS Enhanced support of Vertical and LAN Services	Dec-17	Dec-17	31%
FS_CAV	Study on Communication for Automation in Vertical Domains	Mar-17	Mar-18	100%
cyberCAV	Service requirements for cyber-physical control applications in vertical domains	Jun-18	Sep-18	100%
FS_Vertical_LAN	Study on 5GS Enhanced support of Vertical and LAN Services	Jun-18	Dec-18	88%
Vertical_LAN	5GS Enhanced support of Vertical and LAN Services	Dec-18	Jun-19	0%
SEAL	Service Enabler Architecture Layer for Verticals	Dec-18	Jun-19	0%
FS_Vertical_LAN_SEC	Study on Security for 5GS Enhanced support of Vertical and LAN Services	Sep-18	Mar-19	10%
5GLAN	LAN support in 5G	Jun-17	Dec-18	100%
FS_5GLAN	Study on LAN Support in 5G	Jun-17	Mar-18	100%
5GLAN	Stage 1 of 5GLAN	Jun-18	Dec-18	100%

II

Vertical Standardization in TTA

About TTA

- ❖ ICT Standard Development Organization (SDO) in Korea (+ Testing and Certification)



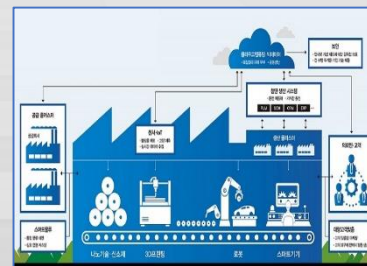
- ❖ Standards for the 4th Industrial Revolution



Communication System for 5G Trial Service - PyeongChang Olympic Games



Blockchain-based IoT Device /Resource Retrieval Framework



Smart Manufacturing Deployment Guideline

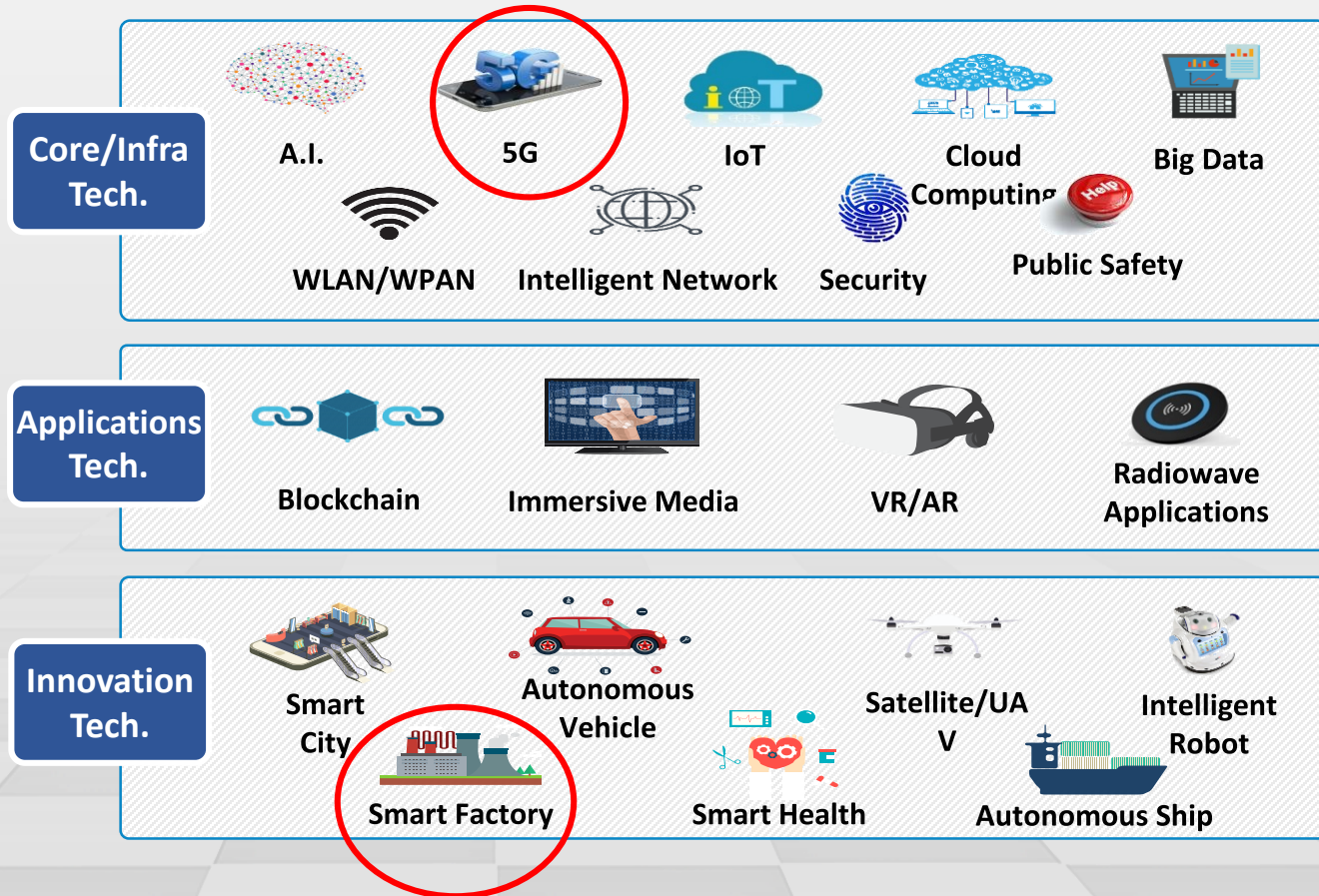


IoT-based Low Altitude UAV Management and Operation System

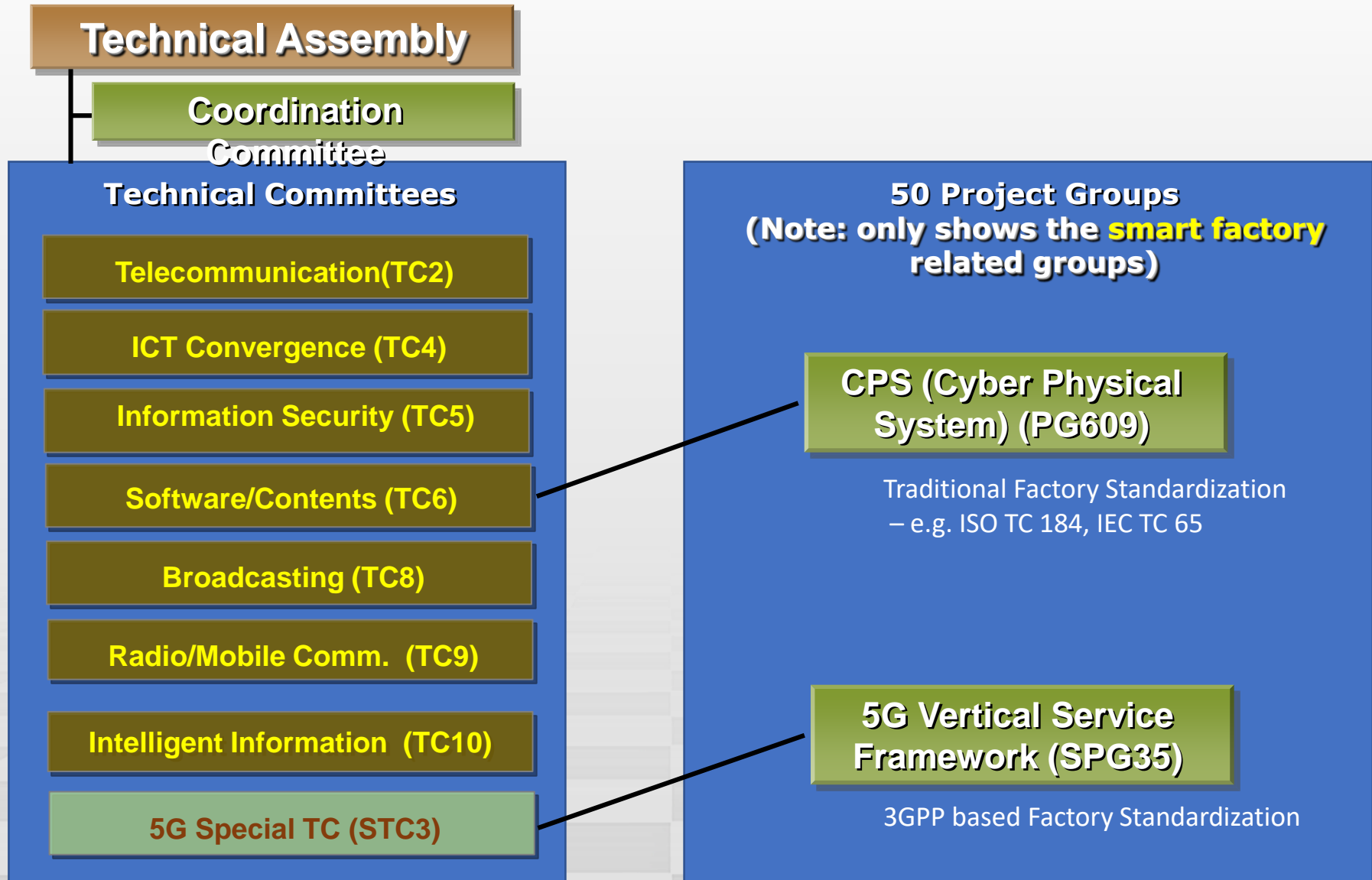
TTA ICT Standardization Strategy (2019)

- (ICT Standardization Strategy Map) To successfully conduct standardization Activities, TTA prepares ICT standardization strategy map every year.
- 20 Key Technologies considering the ICT trends and policies in order to timely respond to the 4th Industrial Revolution

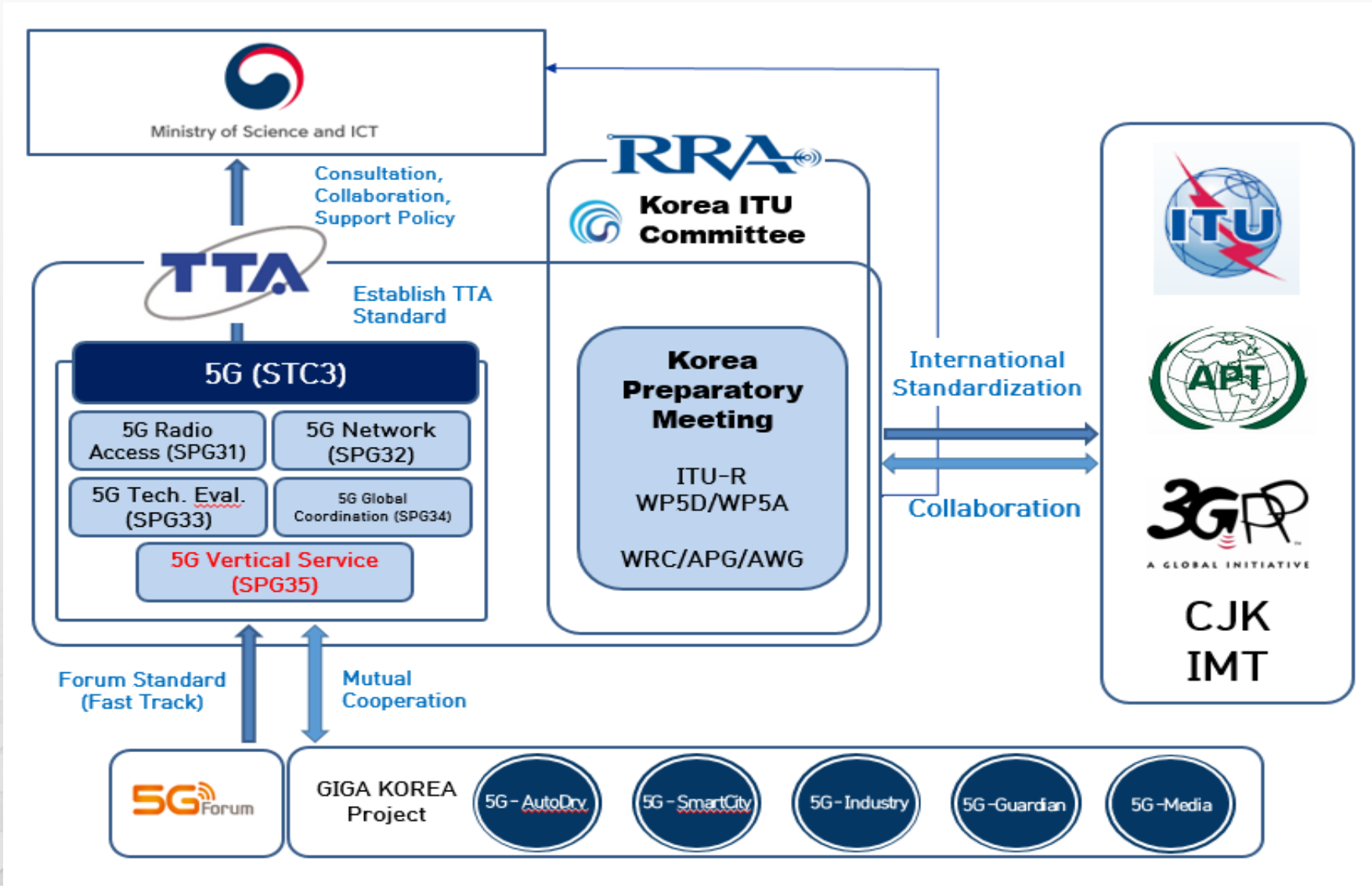
TTA ICT Standardization Strategy Map 2019



TTA Committee Structure



5G Standardization Framework in Korea



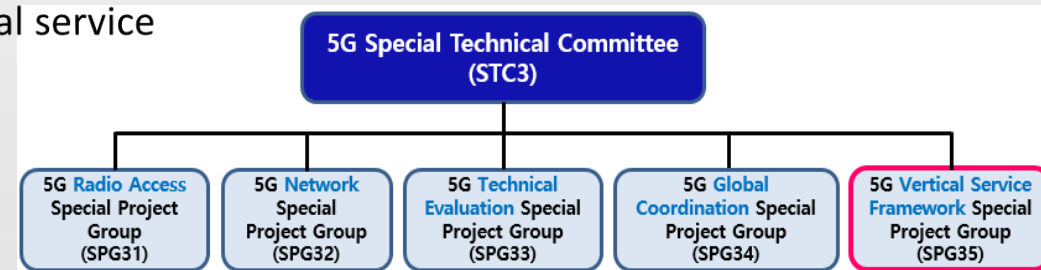
Major Standardization Activities – 5G

● Contribution to global 5G standardization

- Submission of Korea IMT-2020 candidate technology to ITU-R WP5D
 - To support IMT-2020 development and 5G Commercialization.
- Public source codes of IMT-2020 evaluation simulator (TTA SPG33)
<http://wnl.korea.ac.kr/evaluation.html>

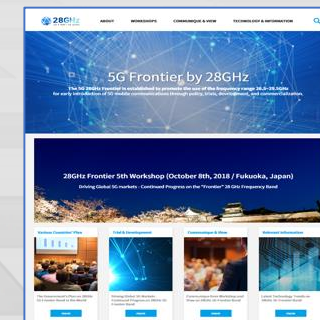
● Initiation of 5G convergence standardization

- TTA SPG35, “5G Vertical Service Framework Special Project Group” (June 2018)
 - To support standardization related to 5G Vertical service

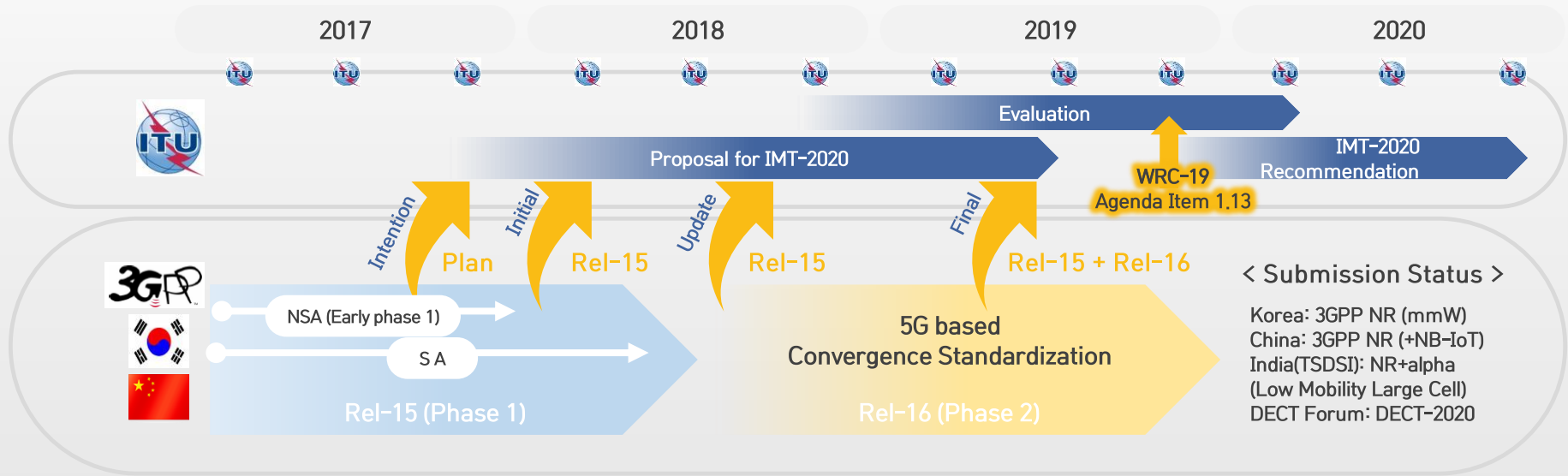


● Collaborative effort to global 5G spectrum

- 5G 28GHz Frontier 3rd Workshop (30 Jan. 2018, hosted by TTA)
 - To promote the 28GHz Frontier band as global 5G band
- Official 28GHz Frontier website www.5g-28frontier.org
 - Operated by TTA to support the 28GHz Frontier activities



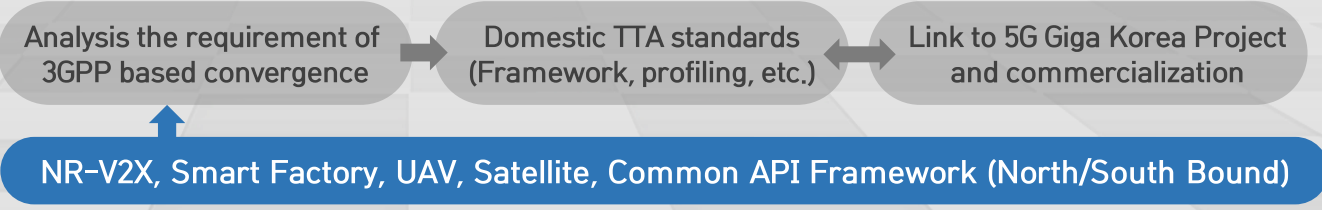
Major Standardization Activities – 5G



5G Tech. Standardization

- Candidate Tech. Final Submission to ITU ('19.7) and its Evaluation (~'20.2)
- 28GHz Self-evaluation, 3GPP based Tech.(NR+mmW) Standardization

5G Convergence Standardization



III

TTA SPG35

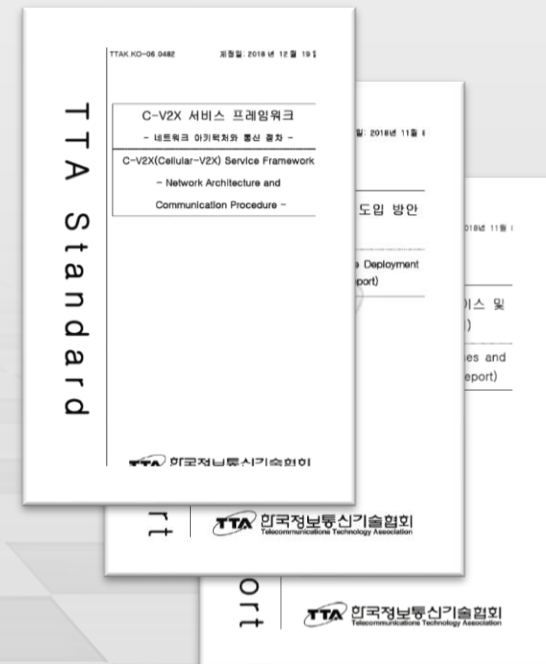
TTA SPG35 (5G Vertical Service Framework)

❖ History

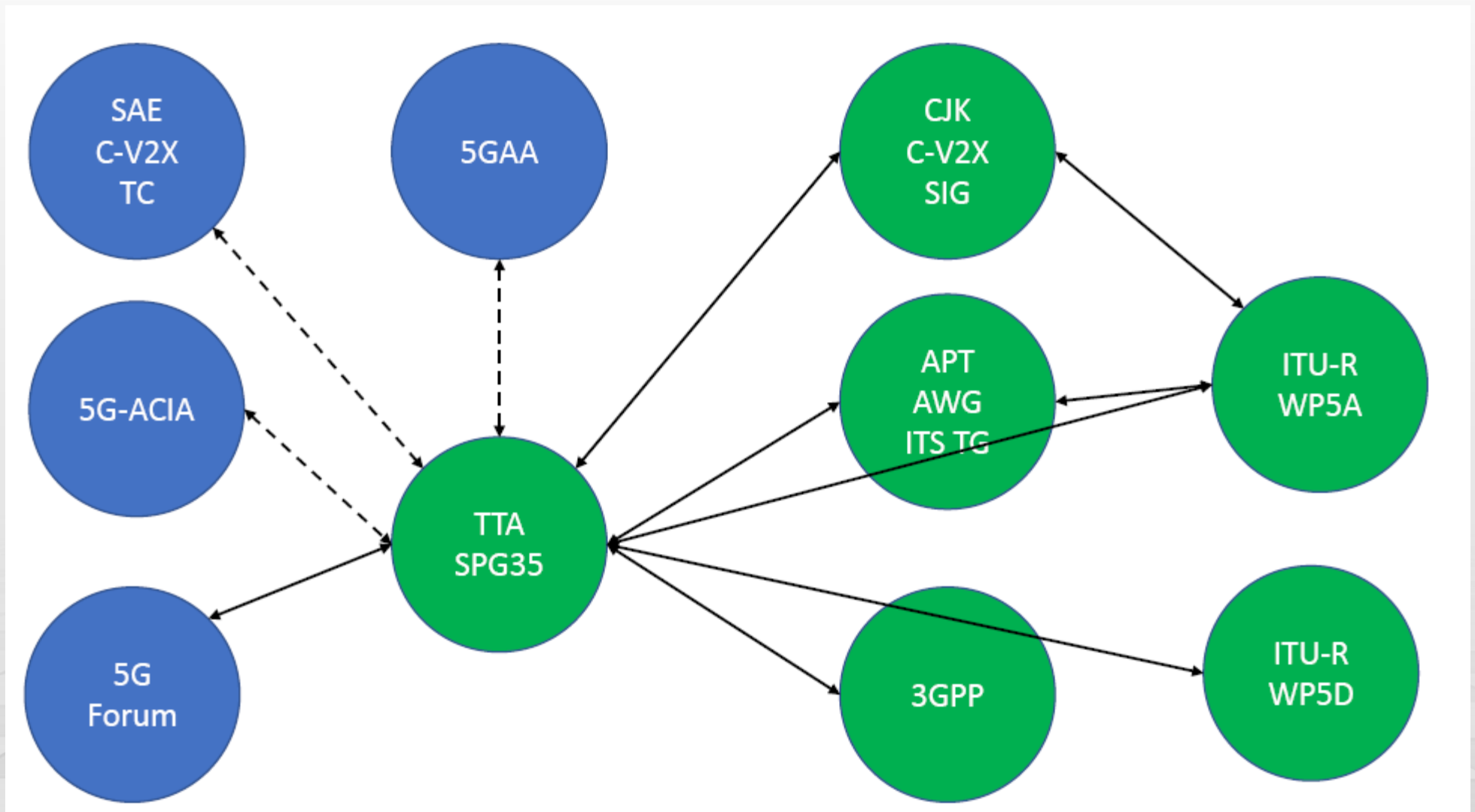
- ✓ (April 2018) Considering acceleration of 5G convergence, domestic industries (Qualcomm, Samsung, LG, SKT, KT, etc.) proposed the establishment of new standardization committee.
- ✓ (May 2018) TTA Coordination Committee approved the SPG35 for the standardization of 5G Vertical Service

❖ Deliverables in 2018

- ✓ Standard
: C-V2X Service Framework
(Network Architecture and Communication Procedure)
- ✓ Technical Reports
: 5G Vertical Service Use Cases and Requirements,
C-V2X Technology and Service Deployment Strategy



Relationship with other entity



Work items & issues in TTA SPG35 (CY 2019)

❖ Focused Items of TTA SPG35 (CY 2019)

- 5G based **Smart Factory**
- 5G based UAV (drone)
- 5G based V2X

❖ Further direction to be discussed

- Activities towards possible **new resolution or question for 5G Vertical** in ITU-R WP5D(IMT)
 - ✓ 5G vertical use case, requirement, capability, technical and operational aspect
- Cooperation item between TTA and ACIA
 - ✓ **profiling specifications** for specific smart factory, etc.
- Other topics
 - ✓ Review the draft revision of ITU-R M.2084-0 (Radio interface standards of V2V and V2I communication) in WP5A, which including 3GPP V2X and others
 - ✓ Review on possible new 5G Vertical WG in CJK(China-Japan-Korea) meeting
 - ✓ Further 5G spectrum considering **5G Vertical spectrum** (5G NR V2X? Smart Factory?)

Thank you. Q&A?