

Beyond 5G Promotion Consortium.

-Organization and activities-

Beyond 5G Promotion Consortium
International Committee
Sub. Chair Kotaro, Kuwazu

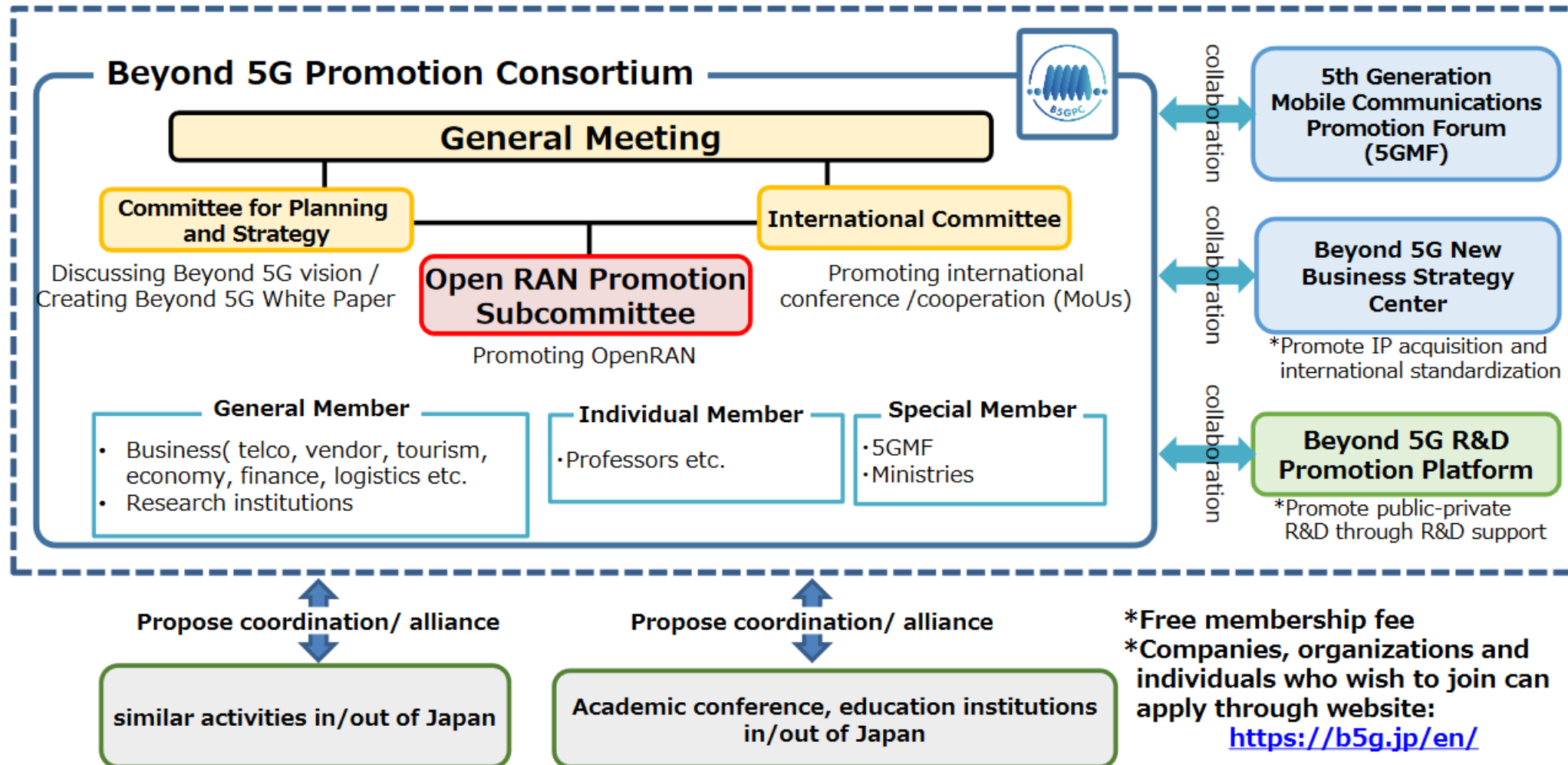
Beyond 5G推進コンソーシアム 国際委員会
桑津浩太郎

Nomura Research Institute
Consulting Division
Research Director

01, Nov 2023

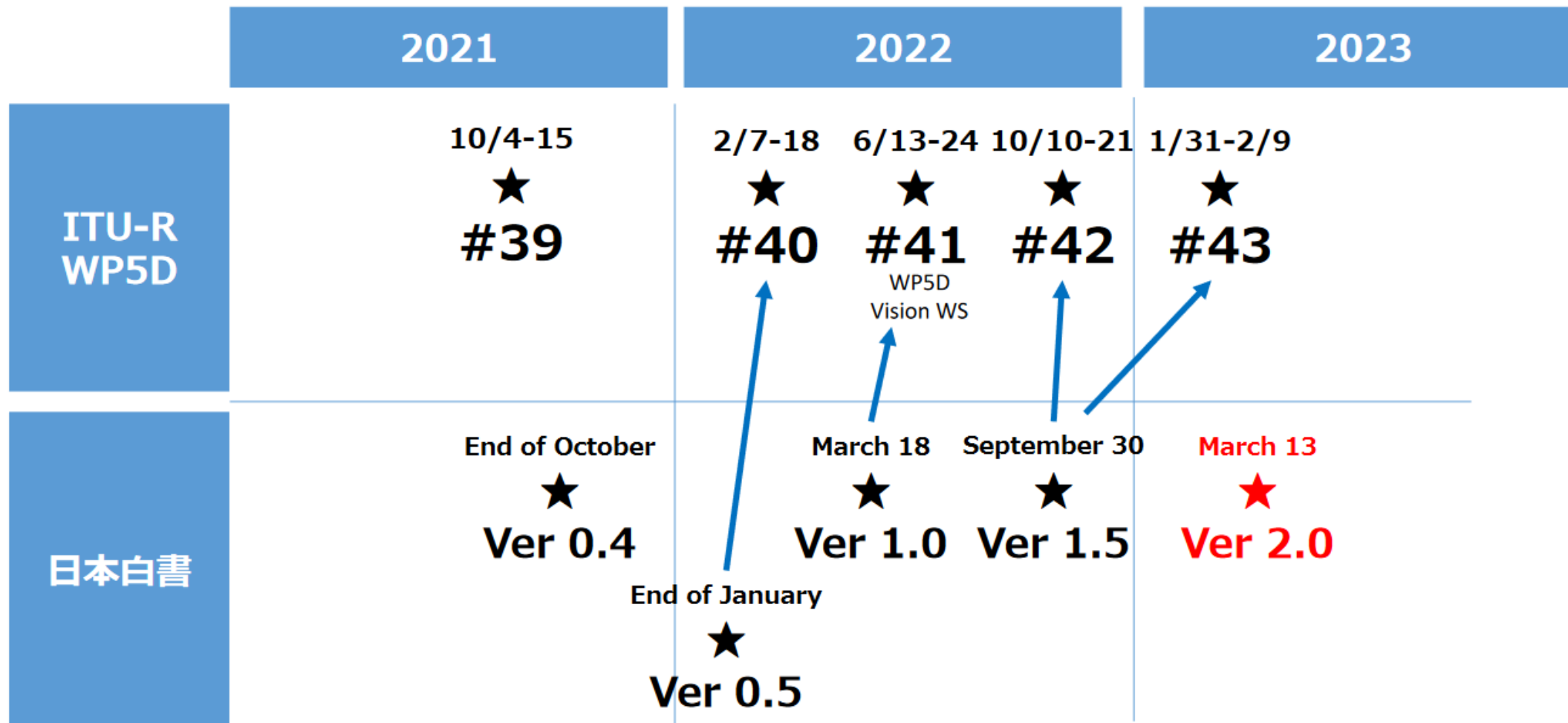


- Established “Beyond 5G Promotion Consortium” to promote Beyond 5G Promotion Strategy through industry-academia-government collaboration.
 - International conference for international cooperation
 - Vision for Beyond 5G, White Paper etc.
 - Open RAN Promotion

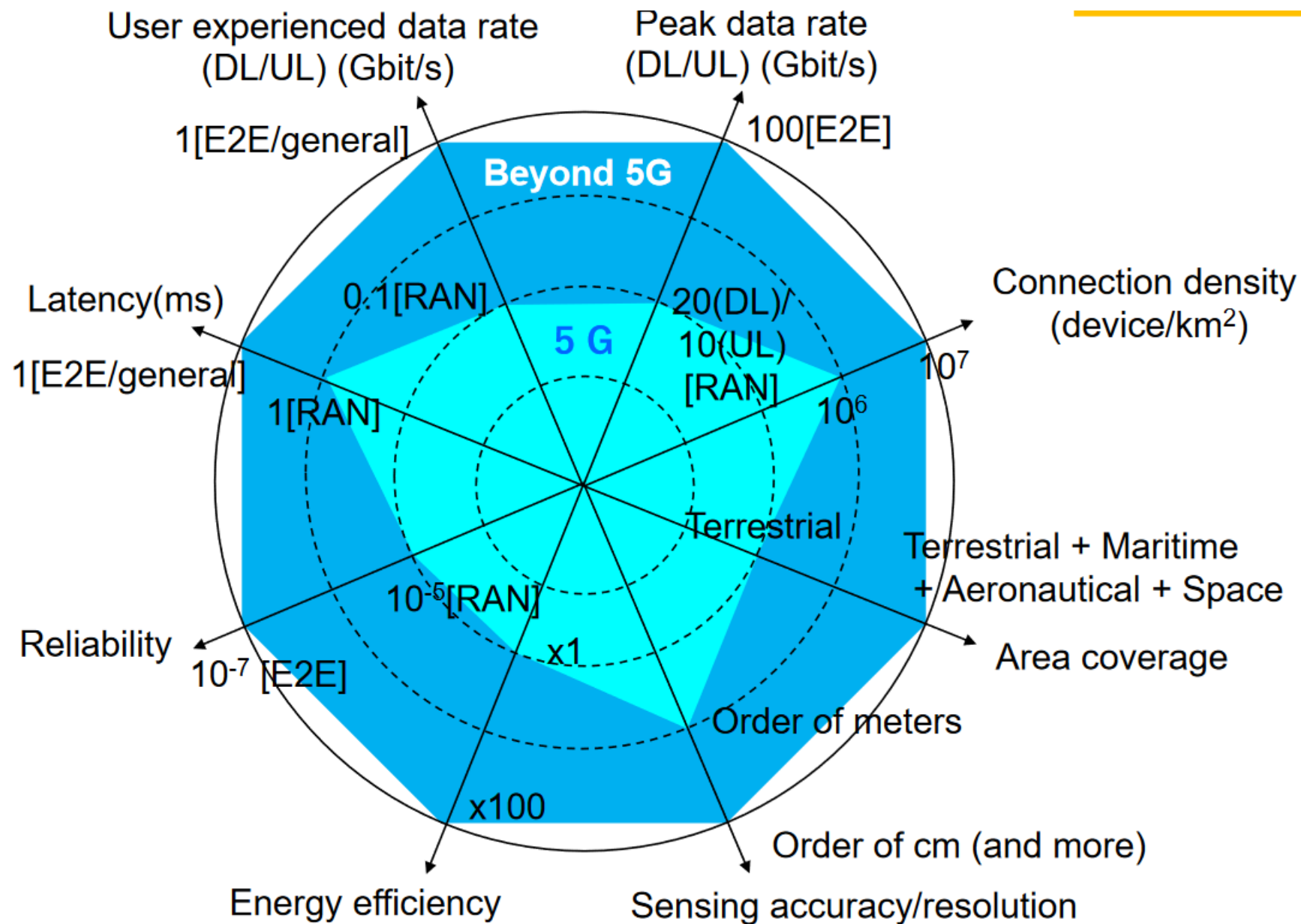


*Free membership fee
 *Companies, organizations and individuals who wish to join can apply through website:
<https://b5g.jp/en/>

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Target KPIs for Beyond 5G.



Example of white paper : Warehousing and Logistics.

Current Situation and Challenges

- Demographic Trends and Labor Shortage
- Safety and security against increasing natural disasters
- Strengthening digitalization and innovation for Society5.0
- Ensuring the sustainability of the global environment the SDGs
- Response to pandemics

Future Vision

- Fully optimized supply chain through Logistics DX and standardization (Simple and smooth logistics)
- Logistics structural reforms against Labor shortage (Labor friendly Logistics)
- Robust and sustainable Logistics Network (realizing strong and flexible logistics)

What is required for Beyond 5G

Evolution of Application
Future
Now

The future Industry with 4G/5G

- IoT
- Local communication
- Cyber ports
- Logistics DX
- Drone

The current Industry 4G/5G

- RF tag
- Logistics IT

The Future Industry with Beyond 5G

- Advanced AI/ML (incl. radio IF)
- Digital twin
- Full automation
- Fast automated delivery
- NTN/HAPS

The Current Industry with Beyond 5G

- Partial automated driving, delivery and tracking
- Basic AI/ML (e.g. delivery scheduling)
- Big data
- Cloud

4G/5G

Beyond 5G

Evolution of Capability

Latency requirement is on **the order of milliseconds** in the local network, and time synchronization is required to **support PTP (microseconds)** as the accuracy of the internal clock including the radio section.

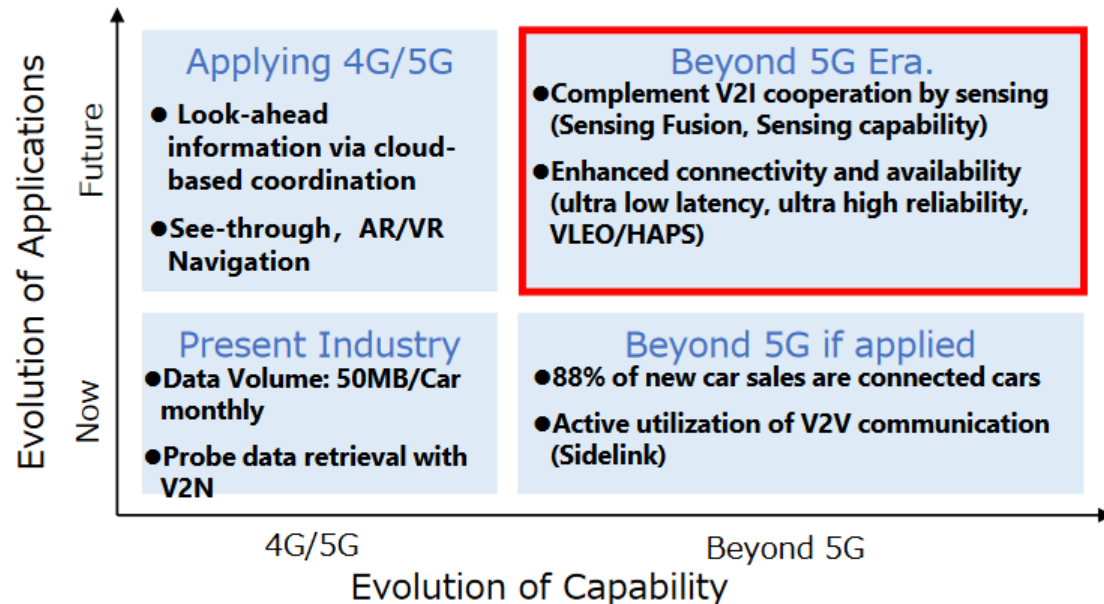
Example of white paper : Automotive.

Towards Automotive Society in 2030 Era, Beyond 5G shall require the integration of highly accurate sensing and communication, distributed AI learning & inference, and ultra reliability

What is required for Beyond 5G

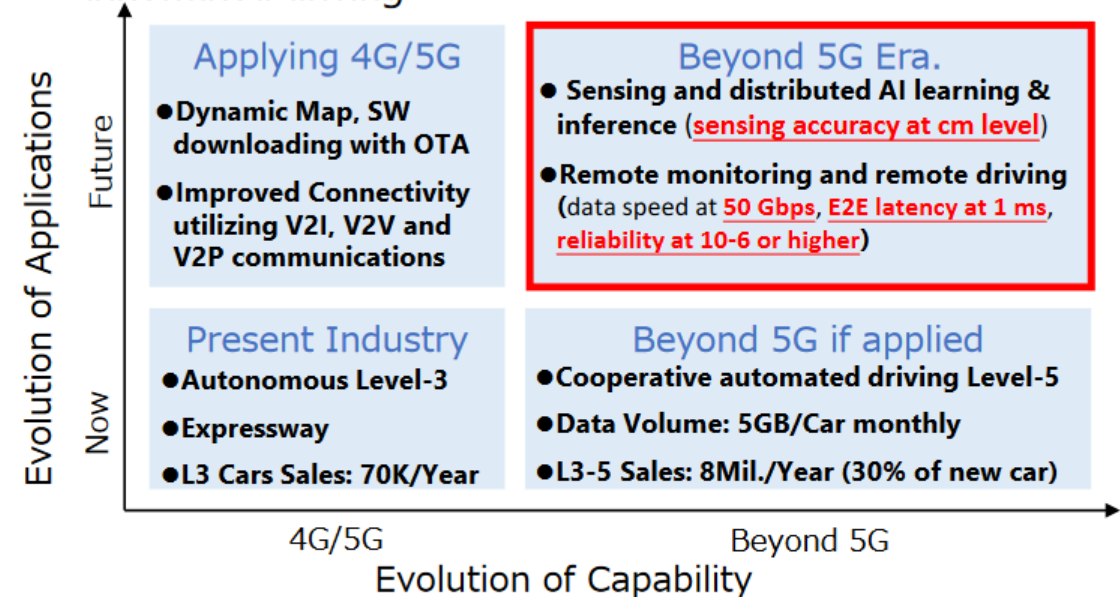
Safety Driving Assistance

Beyond 5G sensing and enhanced connectivity are required so as to support Safety Driving under extreme conditions, e.g., driving at intersections without a signal, under bad weather or in the event of a disaster.



Automated Driving

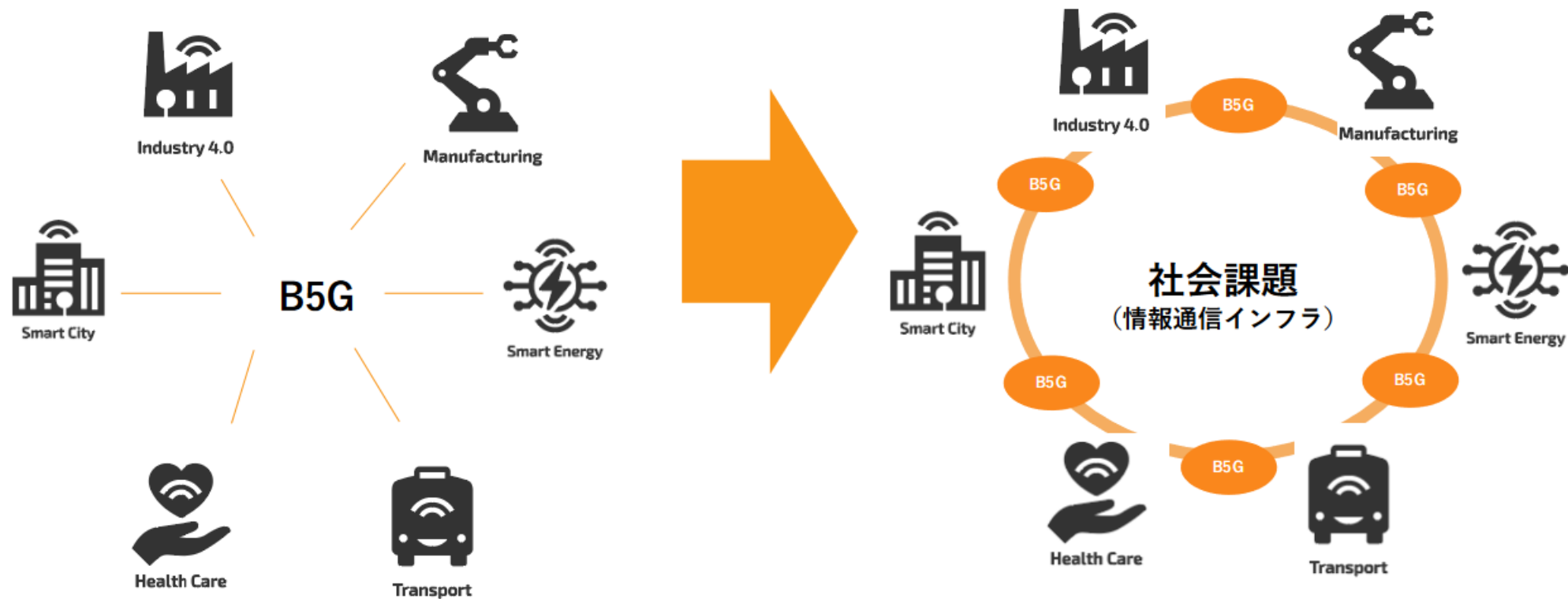
Integrated sensing and communication, distributed AI learning & inference, and quantum-cryptography-based security are required to accelerate the implementation of automated driving



Connecting every industry.

Social issues will follow.

Showing Beyond5G potential and activities is present issue.





もはやライバルではない？富士通とNECが目指すBeyond 5Gの世界



【Beyond 5G×宇宙】2030年の世界の通信衛星ビジネスとBeyond 5G...



【Beyond 5G×協創】リアルとバーチャルの融合



10代が考える教育の課題と未来 (中編)



【WAKU WAKU 2030】みんなでつくろう！土木の未来 (後編)



【Beyond 5G×宇宙】2030年の地球観測衛星ビジネスのリアル (中編)

日米首脳共同声明「新たな時代における日米グローバル・パートナーシップ」(2021年4月16日)



- 5G及び次世代移動体通信網（6GまたはBeyond 5G）を含む安全なネットワーク及び先端的なICTの研究、開発、実証、普及に投資することによって、デジタルにおける競争力を強化する。この取組に米国は25億ドルを、日本は20億ドルを投ずる。
- 国際標準策定における日米両国のICT専門家による連携及び情報交換を強化する。

(別添文書2 日米競争力・強靱性(コア)パートナーシップ — 競争力・イノベーションのセクション)

日EU定期首脳協議共同声明 (2022年5月12日)



- 我々は、また、ICT技術及びサービスの供給におけるオープンで競争的な市場、並びに5GやBeyond 5Gなどの、安全で、多様な、及び強じんな電気通信インフラの重要性を強調する。
(本文：パラ9)
- 幅広いデジタル課題に関する協力を推進するため、日EUデジタルパートナーシップを立ち上げる。(略) 我々のパートナーシップは、オープンで革新的な環境を奨励しつつ、特に、安全な5G、「Beyond 5G」/6G技術、人工知能の安全で倫理的な活用、半導体産業におけるグローバル・サプライチェーンの強じん性に関する具体的な成果を得るため、これらの課題に関する既存の対話を強化していく。
(本文：パラ10)
- 双方は、(i) INDICOパートナーシップのような取組を通じ、これらの標準をグローバルに推進すること、(ii) 5G(セキュリティを含む)、Beyond 5G/6G、IoT、人工知能及びデジタル・アイデンティティに関する共通の目標と構想を達成すること、(iii) 研究開発の初期段階から標準化について協力することについて、既存の協力を継続し、強化する。
(日EUデジタルパートナーシップ：パラ75)

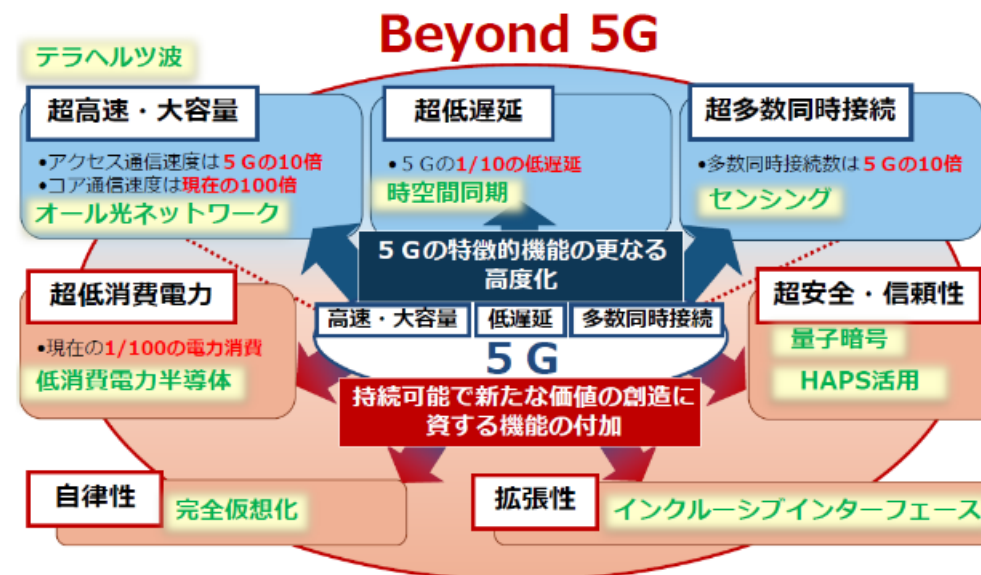
日米豪印首脳会議（クアッド）共同声明 (2021年9月24日)



- 【5G関係】我々は、産業界と連携し、安全・開放的・透明な5G及びビヨンド5Gネットワークの整備を進めるとともに、様々なパートナーと協働してイノベーションを促進し、そして、信頼に値するベンダーの発展やOpen RAN※1のような取組を推進する。5G多様化の実現に資する環境整備に関する政府の役割を認識しつつ、我々は、官民連携の促進を行うとともに、2022年に開放的で標準に基づく技術の適応可能性やサイバーセキュリティの実践に関して連携する。
- 【技術標準化関係】我々は、技術標準に関し、分野別のコンタクトグループを設立し、開放的・包摂的で、民主導・マルチステークホルダーによる合意に基づく関連技術の標準策定を推進するとともにITUなどの標準化機関での連携・調整を進めていく。

※1 Open RAN: 特定のベンダーに依存せず、複数のベンダーを組み合わせ、安全・開放的・透明なネットワークを構築する無線網

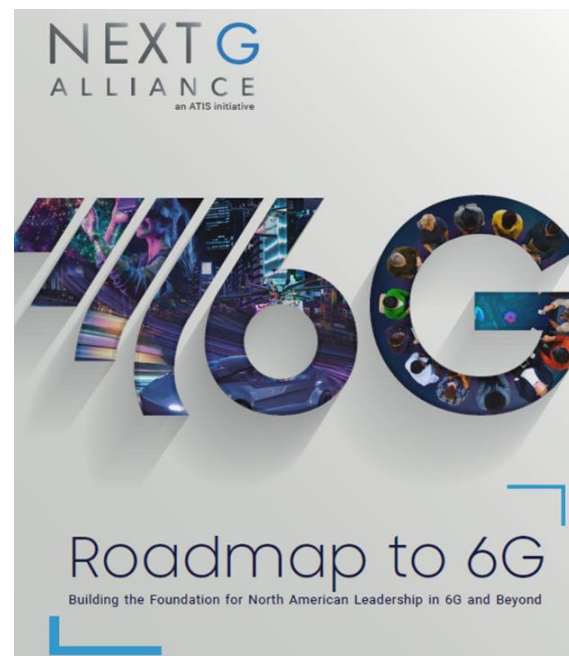
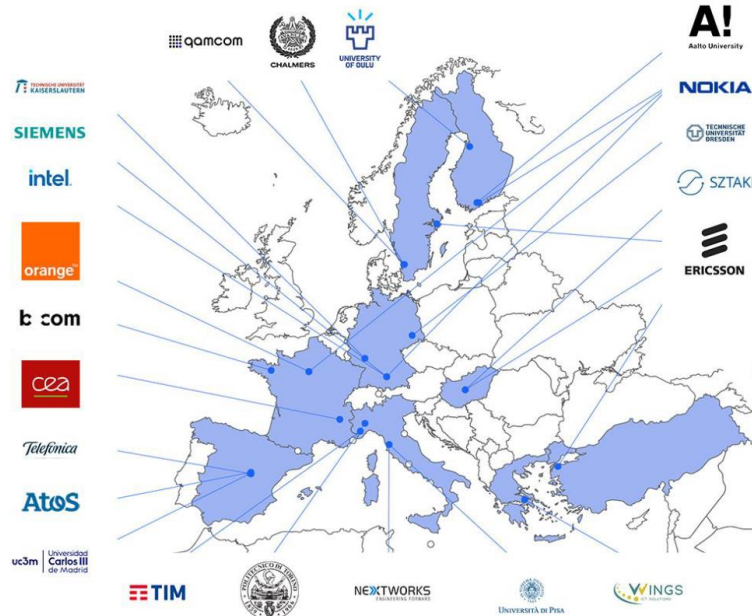
In 2025 exhibition and display of advanced research to the world as a “Beyond 5G ready showcase.”
Demonstrate and accelerate the early realization of Beyond 5G and global expansion



2022年度	2023年度	2024年度	2025年度
Beyond 5G ready ショーケース 構想の検討	展示・実証計画の策定	展示・実証内容の設計・制作	大阪・関西万博において Beyond 5G ready ショーケースの実現

Co-operation with global 6G group and association.

Hexa-X
Consortium



Formation and activities of Int'l Committee.

WG theme	Group Leader
Scalability	Morio, TOYOSHIMA, Ph.D Director General, NICT Network Research Center,
Autonomous	Hideyuki, IWATA, Ph.D S.V.P The Telecommunications Technology Committee
High-frequency	Iwao HOSAKO, Ph.D Director General, NICT Beyond 5G R&D Promotion Unit
Security	Yu, MIYAKE, Ph.D KDDI Research Institute, Security Division Manager
Space-time synchronization	Yuko, HANADO Ph.D Director General NICT Electromagnetic Standards Research Center

Scalability WG

- Advanced satellite systems will be integrated into Beyond 5G.

Satellite

- HTS
- LEO
- HAPS
- Wide area IoT



- Drastic cost cut of transmission.
- High speed, ultra broadband and low latency.
- Advanced device.

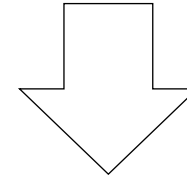
5G tech penetrating into NTN.

- SDN/NFB
- Network slicing.
- Network orchestration.
- Edge computing
- Smoothing combination of space and terrestrial.

Standardization

- 3GPP/ETSI space and terrestrial standardization.
- Lifting up use case.

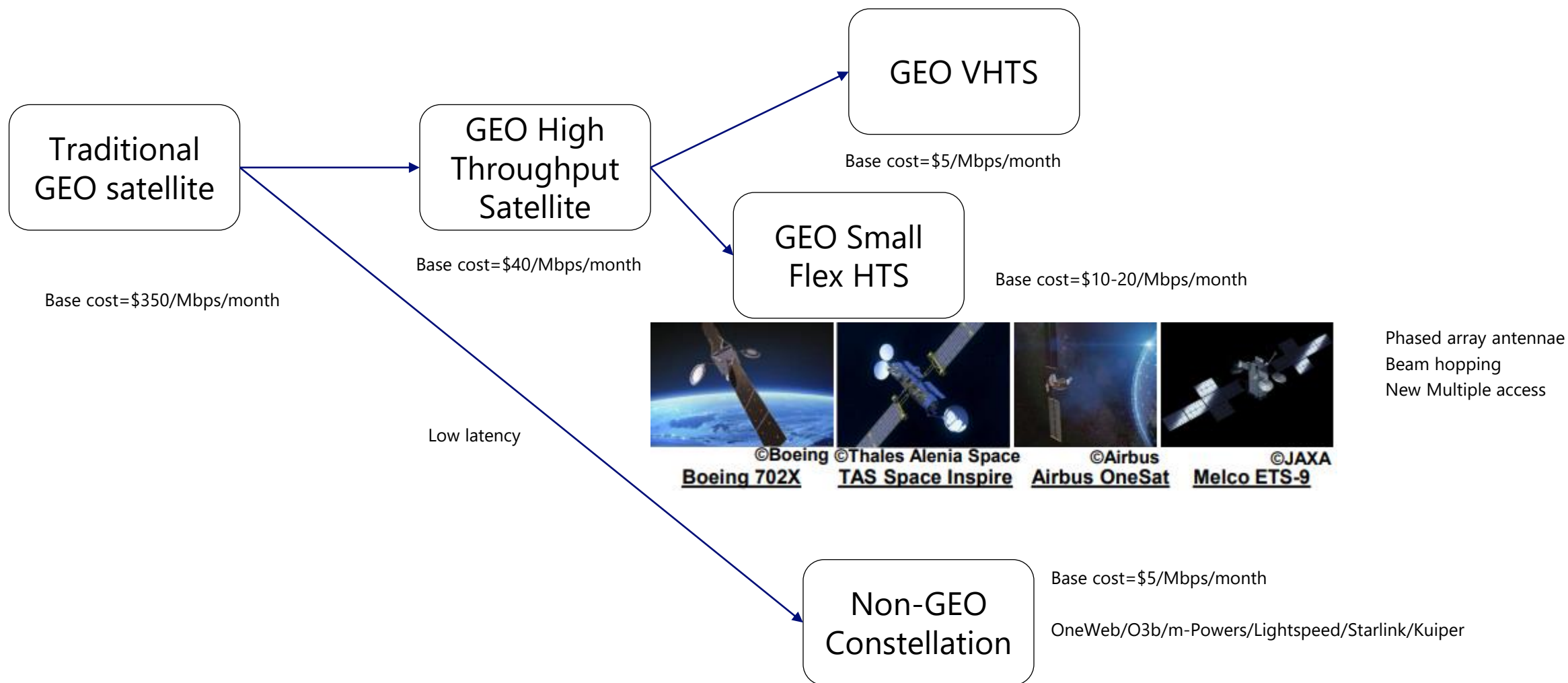
Integrating 5g, satellite • NTN.



Capturing new use case.

- Smart city.
- Mobility.
- Emergency.

- Global satellite broad band capacity will be strongly increased 2.9Tbps in 2019 to 26.5 Tbps in 2026.



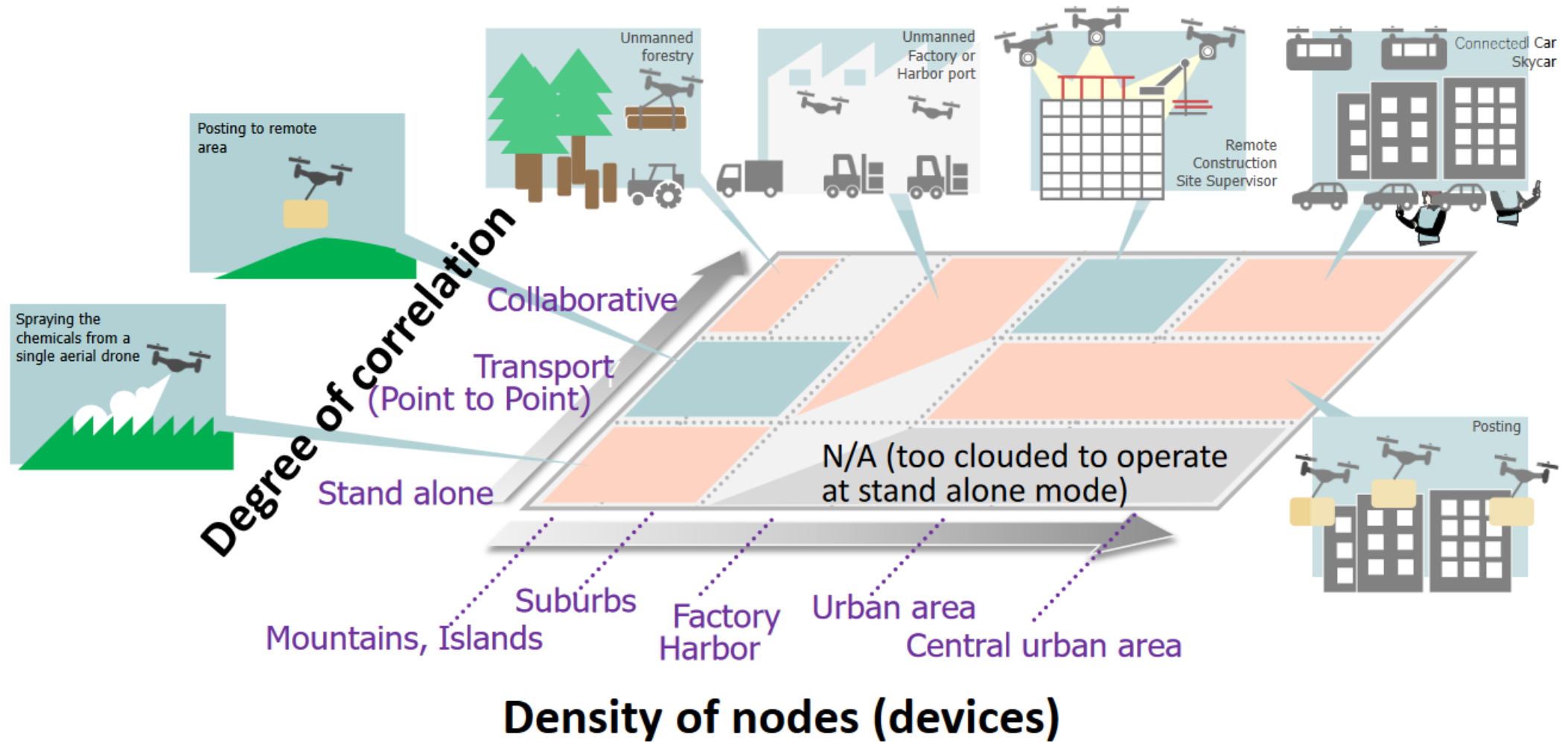
High-frequency WG activity plan for FY2022

- Forums, etc.
 - Beyond 5G Consortium, International Committee, High Frequency WG
 - Terahertz Systems Consortium, THz-6G-WG
 - Terahertz Technology Forum, Information and Communication Division
- Academic societies, etc.
 - IEICE Technical Committee on Microwave Photonics and Terahertz Photonic-Electronics Technologies
- Others
 - Beyond 5G R&D Promotion Project, Trustee Collaboration Meeting Special Interest Group-7

To create a large flow encompassing the above activities.

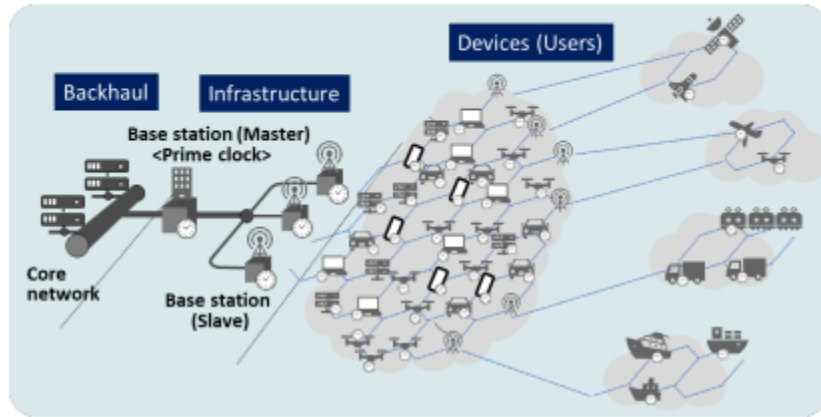
- **Following the discussion of use cases in the THz-6G WG last year, the THz-6G WG will conduct in-depth discussions of technical issues (device performance improvement, assembly, packaging, subsystems, and systems).**
 - **SIG-7 members are invited to participate in this activity.**
 - **The results of the discussions will be disseminated internationally through discussions in the High Frequency WG.**

Space-Time Synchronization technology

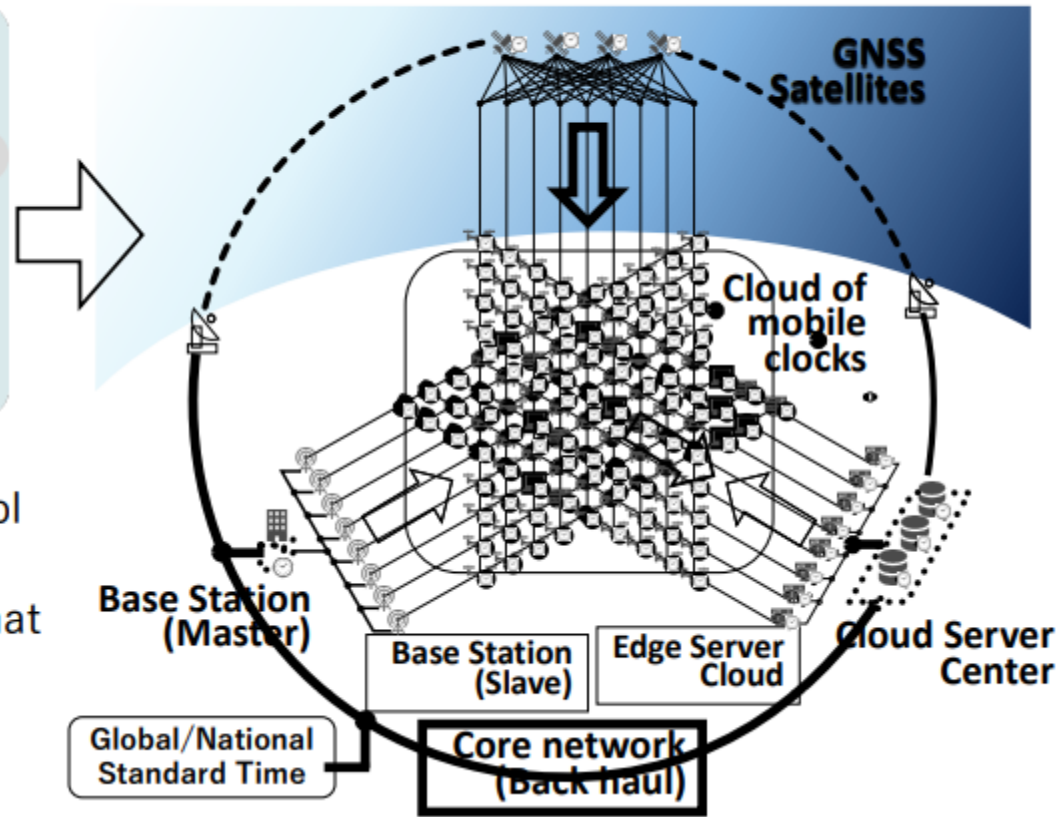


Space-Time Synchronization technology WG

■ Concept idea of a space-time synchronization platform



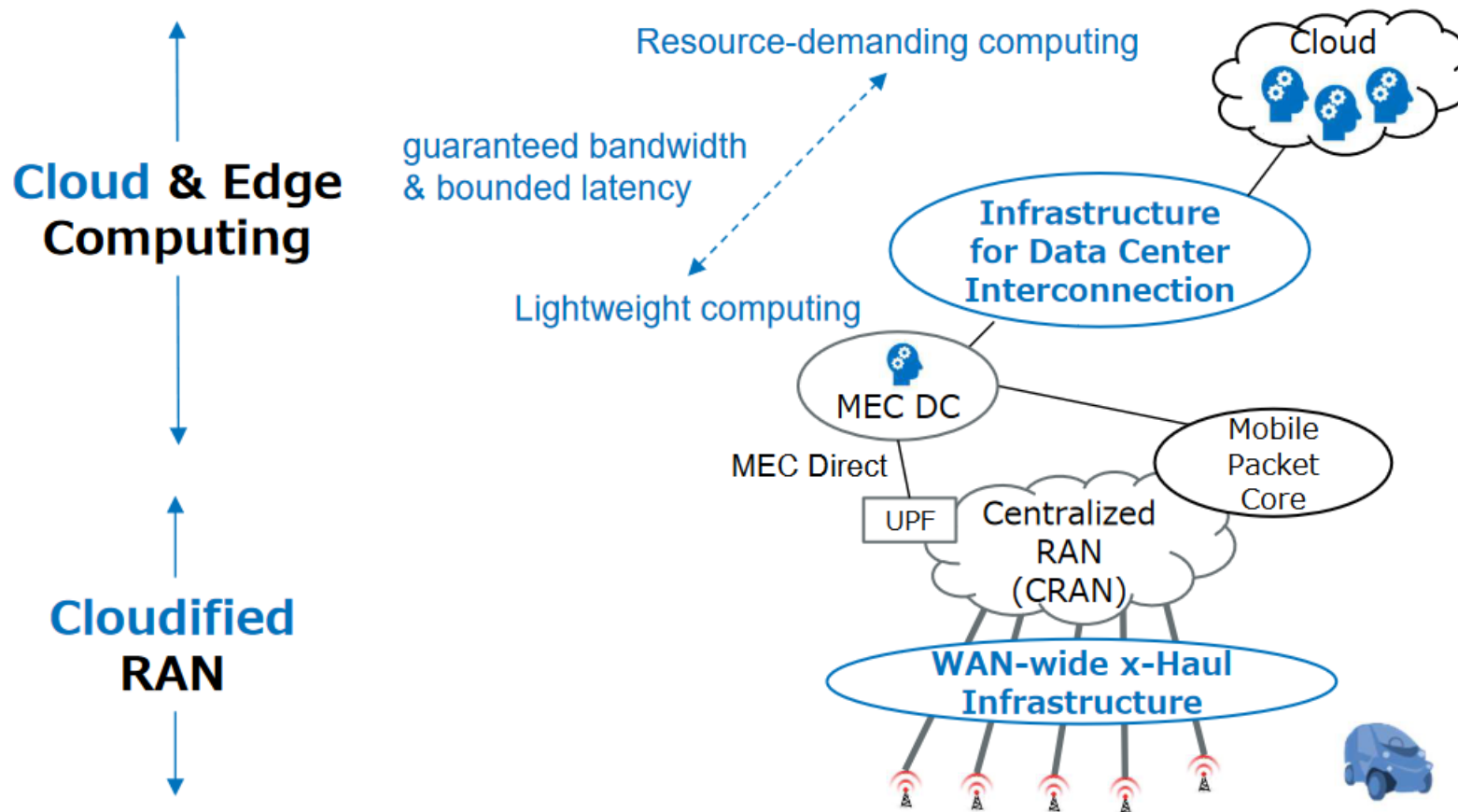
- We need a platform network that properly incorporates multiple layers of time control (rather than relying solely on GNSS).
- This platform will consist of basements that supply time and location information universally, edge servers closest to users, and cooperative mobile clocks on user devices.



Where we should go : B5G Vision (Proposal)

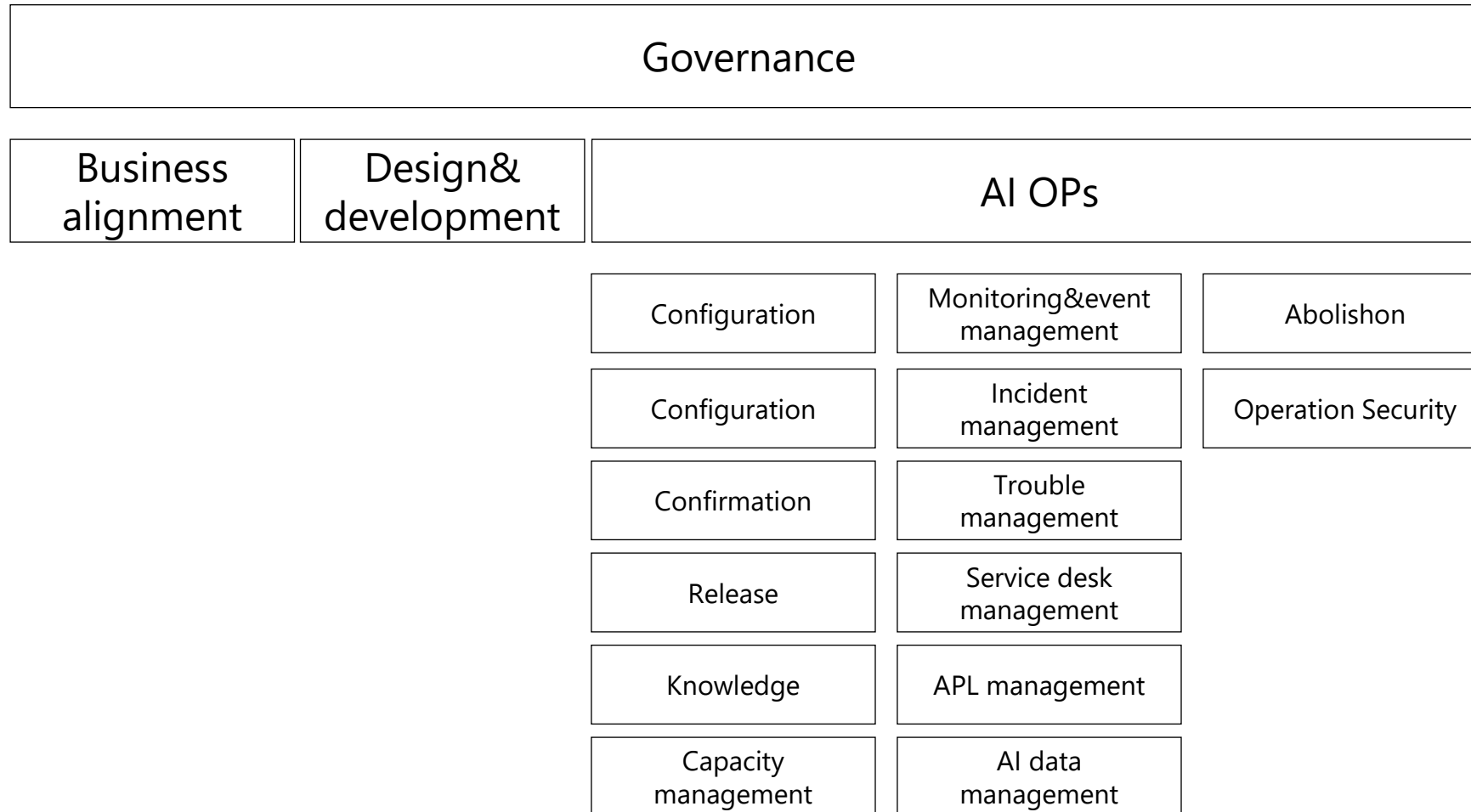


eMBB, URLLC, and mMTC with **Cloud Agility, Elasticity, and Resiliency**



Autonomy WG

- Traditional network management should be re-defined as Beyond 5G requirement such as AI Ops, data management and so on.



Autonomy WG

- Scope of Autonomy WG will cover extended network management.

	3GPP	ETSI ZSM	TM Forum	JPN approach
Reference	TS 28.533 536/312/28.100	ZSM-009-2/3	IG1190	
Configuration	○	○	○	○
Diff Mngt	○	○	○	○
Confirmation	○		○	○
Release	○		○	○
Knowledge	○		○	○
Monitoring	○	○	○	○
Incident	○		○	○
Problem	○	○	○	○
Service Desk			○	
APL management	○		○	○
Capacity			○	○
AI Data management			○	○
Definition&Concept	○			○

Security WG

- Comprehensive requirement for Beyond 5G security issue is under evaluation.

Features	Security requirements
Ultra Fast & Large Capacity	<ul style="list-style-type: none">• High speed encryption/decryption• New security monitoring and processing methods
Ultra Low Latency	<ul style="list-style-type: none">• Seamless security architecture• Lightweight security
Ultra Numerous Connectivity	<ul style="list-style-type: none">• Efficient authentication/authorization• Efficient security processing and monitoring mechanism
Ultra low power consumption	<ul style="list-style-type: none">• Security mechanisms in hardware• Lightweight security architecture
Ultra security and resiliency	<ul style="list-style-type: none">• New security monitoring and defending mechanisms• Resilience mechanism for attacks/failures• Privacy preserving mechanisms• Trustworthiness of different nodes and domains• Accounting, accountability, validation of delivered services
Autonomy	<ul style="list-style-type: none">• Trust mechanism without trusted parties
Scalability	<ul style="list-style-type: none">• Interoperable security mechanism between different networks/domains• Optimization of security mechanism among

Source : Beyond 5G Promotion Consortium

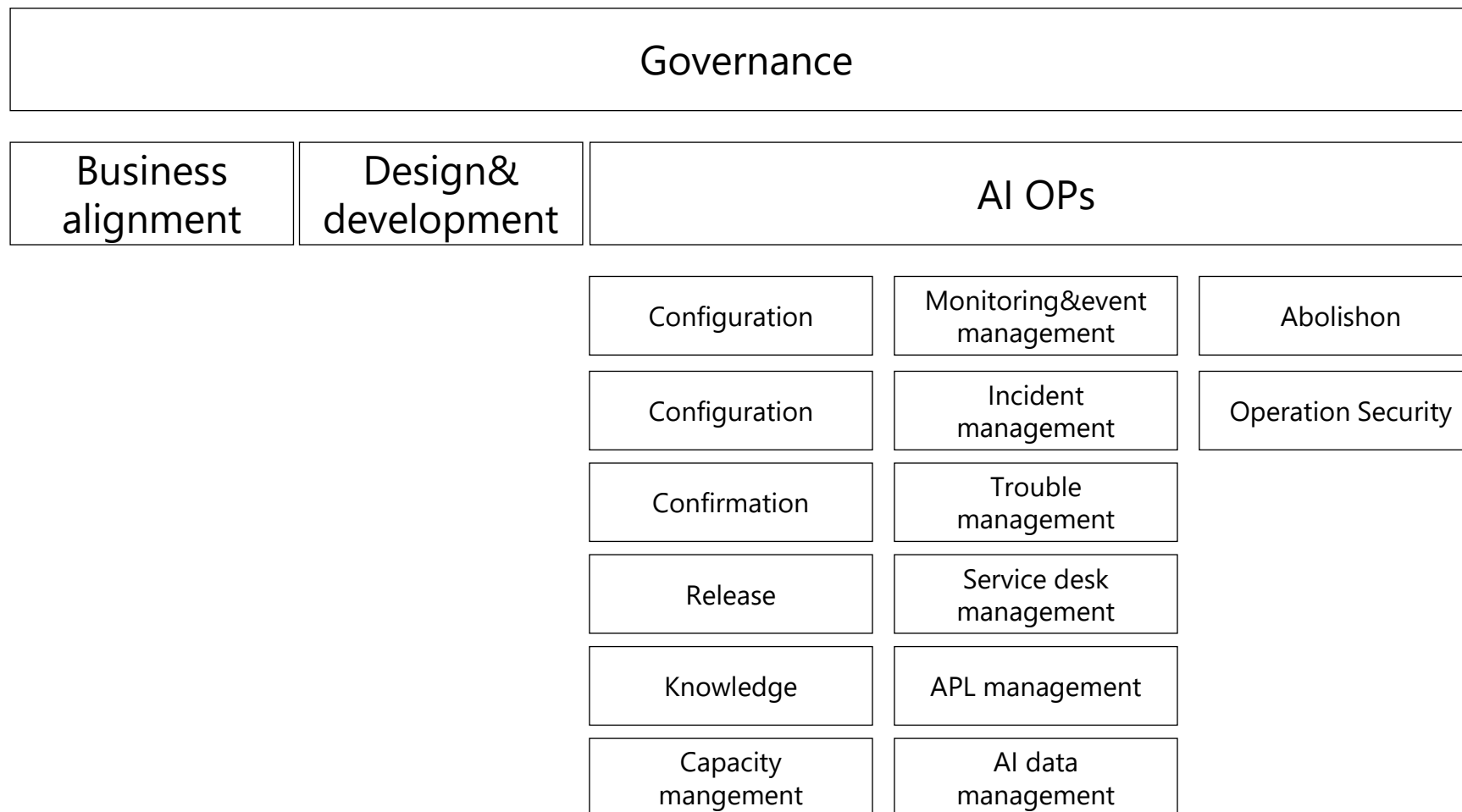
Security WG

- Quantum cryptography is one of the prioritized issue for Security WG.

Requirement	Approach
Quantum computing deployment for Beyond 5G.	Quantum cryptography (QKD) transmission. Anti/Post-quantum computing cryptography algorithm development.
Ultra-speed, capacity and ultra low latency communication.	Development of high speed encryption algorithm.

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Monitoring	○	○	○	○
Incident	○		○	○
Problem	○	○	○	○
Service Desk			○	
APL management	○		○	○
Capacity			○	○
AI Data management			○	○
Definition&Concept	○			○