GTI Industry Briefing

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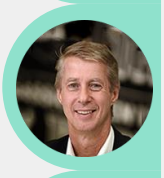
GTI Summit · Shanghai 2021 Highlights "5G In The Moment" to Promote Global Commercialization (1/3)

The GTI Summit · Shanghai 2021, themed with "5G In The Moment", was held on 23rd February at MWC Shanghai 2021. It has been held by adopting an innovative approach of "in-person + virtual" for the first time. This grand summit was attended not only by the delegates from organizations, operators, verticals and partners onsite, but also by thousands of visitors online, to jointly share the current status and challenges of global 5G commercialization, and explore the exciting innovative application practices in the course of 5G integration with all walks of life to create new business opportunities. *(Click here **to watch speech videos**)*

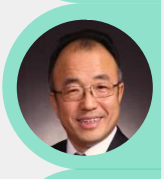
Mr. Craig Ehrlich, Chairman, GTI
2020 has been an extraordinary year. Despite of the pandemic, GTI has been exerting its efforts to further expand the global industry ecosystem, address key issues in development, and to enhance international cooperation.

Mr. Liu Liehong, Vice Minister, MIIT of China
In response to challenges of post-pandemic era, digital transformation and high quality development, 5G is playing its role. We shall accelerate digital infrastructure, enhance technology innovation, build converged innovation ecosystem, and strengthen cooperation to achieve a win-win situation.

Eng. Bassam Albassam, Deputy Minister of Telecom and Digital Infrastructure, Ministry of Communication and Information Technology in Saudi Arabia
Those with more developed digital infrastructure are better able to respond to the pandemic, set out a road of economic recovery and build resilience for the future.



Mr. Mats Granryd, Director General, GSMA
5G is being deployed much faster than 4G in its early years despite Covid-19, which indicates that the need for 5G is real and the direction is right. And over the next decade, we expect a wave of mobile-led technology unicorns born from 5G that will drive our future economies.



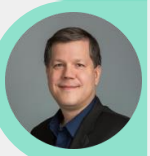
Mr. Gao Tongqing, Executive Vice President, China Mobile
Not only on the future growth momentum of 5G, and also on the feature that 5G can facilitate the future economic and society transformation. Even further, 5G is basically a mind changer that changes the way we think about the world that we're in.

Mr. Song Qizhu, Chairman, China Broadcasting Network
We will build a high-quality, green, trustable, agile, intelligent 5G network. Our plan this year is to promote 700MHz 5G network.

GTI Summit · Shanghai 2021 Highlights "5G In The Moment" to Promote Global Commercialization (2/3)

Mr. Kazuyuki Yoshimura, CTO, KDDI
We need various technologies such as 5G and Beyond 5G to realize Society 5.0. But it is insufficient, because we believe that Platform layer and Business are also important.

Mr. Khanungdej Triratupathum, CTO, True
We run across all technologies of the cellular, from 2G to 5G. It is a challenge for us to manage this kind of technology and spectrum. In the next three years, we will get more spectrum, promote reforming, and shut down some old technologies to coordinate different technologies and spectrums.



Mr. Ron Marquardt, VP of Advanced Technologies and Innovations, T-Mobile US
Over time, as capabilities grow, we see customers demanding the utility 5G will bring, not just the raw speeds and more and more.

Mr. Lee Sangheon, Director of Network R&D Unit, LG UPLUS
Our key strategy is based on the better network performance with the reasonable data plan. On top of that, we'd like to provide the differentiated 5G services.

Mr. Wang Tao, Executive Director of the Board, Huawei
To achieve high-quality 5GtoC, it needs to build premium networks to provide ultimate user experience, and promote innovation to upgrade traditional services and inspire new applications. For 5GtoB, it is to bridge development gap, by exploring real needs, building one-stop platform solutions, and sharing between different technology domains, industries, and disciplines.

Mr. Börje Ekholm, President & CEO, Ericsson
5G will be the catalyst for enterprise transformation. Countries that lead this development will develop a massive competitive advantage. On the other hand, countries that fall behind on rolling out the 5G technology, their economy and competitiveness will suffer.

Mr. Xu Ziyang, Executive Director & CEO, ZTE Corporation
Development in this stage will encounter both technology challenges and business uncertainties. For this, we will not only make continuous innovations and create value, but also to strengthen "agile" capabilities to lower startup costs, and make quick trials and iterations.

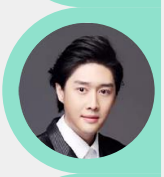
Mr. Chris Johnson, Senior Vice President, Nokia Enterprise
5G has emerged as the critical industrial-grade enabler for IT/OT convergence. It is at the intersection of IT and OT, where the disruptive power of 5G sits.

Mr. Peter Froeschle, CEO, ARENA2036
5G is the catalyst for industry 4.0, and it connects all use cases into one large ecosystem.

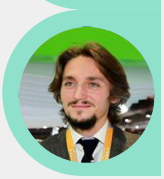
Dr. Andreas Mueller, Head of Communication and Network Technology, Bosch Corporate Research & General Chair of 5G-ACIA
5G becomes the central nervous system of the factory of the future.

GTI Summit · Shanghai 2021 Highlights "5G In The Moment" to Promote Global Commercialization (3/3)

Mr. Xia Peng, Chief Commercial Officer, APAC, Manufacture, GE Digital
This heralds an era of industrial superheroes. To create tens of millions of superheroes, we must bring leading technology, strong capabilities and collaboration into an industrial cycle. In light of the 5G and Industrial Internet revolution, we need to work together towards lowering the technical barrier.



Mr. Qi Xiao, President, SoReal
We will bring the technology and culture to the world. With the 5G roll-out and the arrival of a digital intelligent era, XR will be the general trend with its powerful content production, immersive interactive experience and positive ecosystem. 5G cloud XR will create ultimate immersive experience.



Mr. Pierre-Albert Chounet, Senior Manager of Competency Center, Schneider Electric
Automatic crane monitor video signal and PLC control signal demand high for wireless transmission. 5G will further improve such performance with its wide broadband, low latency and high reliability.

Release of *5G Wireless Evolution White Paper: Towards a Sustainable 5G*

As 5G has been deployed, 5G evolution becomes vital for operators and the industry. To further envisage the emerging use cases of 5G evolution, China Mobile jointly released the "5G Wireless Evolution White Paper: Towards a Sustainable 5G" with global leading operators including KT, NTT DoCoMo, China Telecom, China Unicom, China Broadcasting Network, KDDI, SK Telecom, LG UPLUS, Maxis, and many major partners including Huawei, Ericsson, Qualcomm, Nokia, MediaTek and ZTE, to elaborate key requirements and potential technologies of 5G evolution.

For Video Playback, please visit https://www.gtigroup.org or scan QR Code

GTI WeChat Official Account

The 30th GTI Online Workshop Held to Address Key Issues of Accelerating 5G Development

The 30th GTI Online Workshop was held on 23rd-25th March, 2021. It had been attended by the virtual participation of over 300 attendees from more than 30 global operators, such as AT&T, Bharti Airtel, KDDI, LG UPLUS, NTT DOCOMO, Rakuten, Singtel, SoftBank, Telefonica, T-Mobile US, Turkcell etc., dozens of industrial partners and international organizations like 5G-ACIA. The workshop has provided the industry leaders and experts with an excellent opportunity to discuss and share their views on the key issues of accelerating 5G development.

Madam Huang Yuhong, the Secretary General of GTI, presented some of the key achievements made in 2020. In the opening notes, she highlighted GTI's great efforts in fostering right regulatory environment for 5G, promoting unified spectrum allocation as well as accelerating 5G end-to-end maturity. Furthermore, she called on the global industry partners to conduct continuous in-depth collaboration, put much focus on 5G network, device, innovative business and services, and continue their efforts to address key issues on system power consumption, module cost and private network solutions, so as to enable the faster and scalable development of 5G industry.

Then the workshop fell into four sessions to explore hot issues in a specific and in-depth way.

In 5G network, many key issues on SA commercial use such as multidimensional 5G spectrum sharing strategy, VoNR and power saving were discussed to accelerate industry maturity and the implement of commercial use. **In 5G device**, topics of 5G UE power saving, R16 new features and requirements for 5G chipset, 5G module cost optimization and network slicing match-up were much focused on for the improvement in performance and evolution of device. **In 5G enterprise network solutions**, the workshop intended to address key technological issues in application deployment for vertical industries, such as 5G+ industrial proximity network, 5G+ Bluetooth indoor positioning, digital twin based intelligent network operation among others, to drive global operators to provide premium IoT and private network service, and to promote high quality development enabled by 5G. **In 5G Cloud XR**, the workshop made an exploration into the major issues on technical architecture and standardization faced by 5G Cloud XR scalable development, and also defined the future work scope and plans.

Click below for GTI newly published white papers and presentation documents:

White Paper: http://gtigroup.org/Resources/rep/

Presentations: http://gtigroup.org/e/action/ListInfo/?classid=494

GTI Awards 2021 Winners Unveiled Online

After comprehensive evaluation on contribution to 4G evolution and 5G development, a total of 2 operators, 7 industrial partners and 4 individuals across terminal, chipsets, network infrastructures, test systems and verticals have stood out and won the GTI Awards.

Cat 1: Innovative Breakthrough in Mobile Technology Award
Cat 2: Innovative Mobile Service and Application Award

- **Ericsson** - Street Macro B41
- **Huawei** - 5G Super Uplink Innovation Solution
- **Keysight Technologies** - 5G-NR NSIOT (Network Simulator Interoperable Testing)
- **MediaTek** - Dimensity 1000 Series
- **Nokia** - End-to-end 4G and 5G NR slicing solution
- **Qualcomm Technologies** - Snapdragon™ 888 5G Mobile Platform
  - Snapdragon™ XR2 Platform
- **ZTE** - PowerPilot Solution

Cat 3: Market Development Award

- **Huawei** - The 5G Private network for Hualing Xianggang Project
- **Rakuten Mobile** - Build the world's first end-to-end fully virtualized 4G and 5G commercial network

Cat 4: Honorary Award

- **Cao Yiqing (Qualcomm Technologies)**
- **Mustafa KARAKOC (Turkcell)**
- **Nie Zhaohui (Huawei)**
- **Peng Yangyang (Smarter Micro)**

GTI Key Moments
---A Look Back to Our Story of 10 Years

GTI

2011
Kick-off of GTI by China Mobile, SoftBank, Vodafone and other operators

2012
Release of world's first TDD/FDD Multimode chips

2013
Release of world's first MMMB smart phone

2014
World's first TD-LTE VoLTE phone call was made

2015
Release of 5-Mode Low Cost Device Solutions

Release of Native RCS Devices

2016
Launch of **GTI 2.0** by China Mobile, Bharti Airtel, KT, SoftBank and Vodafone to promote 5G development and cross-industry innovation

Release of HPUE on Band 41 to promote Massive MIMO commercialization and improve systematic performance

2018
Release of GTI 5G S-Module Industrial Cooperation Plan to promote wide application of 5G devices and expand the scale of application

Release of 5G in China-the Enterprise Story with GSMA

2019
Debut of 5G 2.6GHz End-to-end Products to accelerate maturity of 2.6GHz industry chain and promote 5G commercial process

2020
Release of Supportive Policies for a Sustaiznable Mobile Industry in the 5G Era with GSMA to promote sustainable mobile industry

2020
Release of GTI 5G Global Device Initiative to promote maturity of multi-mode, multi-band and multi-form devices

More to come…

5G to 5.5G: Wireless Innovation is An Endless Frontier (1/2)

At the 2021 IEEE Wireless Communications and Networking Conference (WCNC 2021), Dr. Zhu Peiying, a Huawei Fellow leading research on 5G wireless systems at Huawei Technologies Canada, delivered a speech titled "5G to 5.5G: Wireless Innovation Is An Endless Frontier".

- **Wireless Innovation Is An Endless Frontier**

Dr. Vannevar Bush once described science as an endless frontier. Dr. Zhu said that, in a way, the wireless industry can also be a frontier for its endless opportunities for innovation. 5G has seen massive commercial rollouts, which are starting to yield positive gains while exciting sustained innovation of 5G technologies.

5G has been adopted commercially at staggering rates. Compared with 2019, the number of commercial 5G networks, terminal types, and users has multiplied by 18, 17, and 250 times, respectively, registering over 140 networks, 550 terminal types, and 250 million users. 5G has also transformed user experience and advanced industrial digitalization. AR/VR users have grown by 35% annually, and over 5,000 industry practices such as 5G port and 5G steel have begun to see the market size effect.

As 5G continues to hit new milestones on the commercialization roadmap and the 5G industry breeds new technologies, new frontiers of 5G are becoming clear. To evolve 5G to 5.5G, the growing demands for immersive experience such as XR and holograms as well as the diversified and complex IoT demands such as machine vision and V2X must be met.

- **2025 Vision — 5.5G Definition and Standardization**

"The industry has identified four factors to realize the 5.5G vision. First, incumbent 5G capabilities have to be reinforced to catalyze 5G industry development. Second, high-speed real-time experience is a must to enjoy immersive applications such as XR and holograms. Third, uplink-centric networks must be built to provide 10-fold uplink speed for industrial digitalization. And finally, 5G network capabilities must be scaled out to support new business opportunities," said Dr. Zhu.

The question is, what defines 5.5G? Expanding from the three standard 5G scenarios defined by the ITU — eMBB, mMTC, and URLLC, Huawei proposes three new additions — Uplink Centric Broadband Communication (UCBC), Real-Time Broadband Communication (RTBC), and Harmonized Communication and Sensing (HCS), to form the 5.5G matrix. In these scenarios, Huawei predicts that 5.5G will vastly outperform 5G in many aspects. For example, continuing from 5G, 5.5G will cut down the cost-per-bit of eMBB by 10 times, deliver higher uplink capabilities by using UCBC to meet the requirements of 80% of toB scenarios, provide Gbps downlink rates at a low latency of 5 ms to increase the number of XR users multiple times with RTBC, and enable full-scenario high-precision indoor positioning with low-power centimeter-level positioning and wide-area high-resolution sensing to enhance the safety of self-driving cars and elder care in specific areas.

5G to 5.5G: Wireless Innovation is An Endless Frontier (2/2)

It takes three to five years for a new technology to normalize operations and reach maturity. Uplink enhancement, for example, requires much time to diversify new terminals in addition to extensive research on technologies such as multi-band uplink aggregation and uplink massive array. It also takes time to prepare the supporting policies and industry as 5.5G will need more spectrum resources in the sub-100 GHz band. To realize the 2025 vision, Dr. Zhu called on the industry to finalize 5.5G standardization in 3GPP Release 18 and beyond.

- **2030 Vision — Visualize the Next Generation**

Each generation of mobile communications technology has reigned for about a decade, before being superseded by a new standard. With the fast commercialization of 5G technologies, we are closer to realizing the connection of everything. In the future, 5.5G will lead us to the era of intelligent Internet of everything.

6G will come after 2030. What will be the vision of new generation network? In next 10 years, intelligence will be everywhere in our lives, and it will be more distributed than centralized. "The network will do much more than just transmit data. It will become a distributed intelligent entity that can merge the real and digital worlds", Dr. Zhu predicted.

Huawei's 5G Super Uplink Wins GTI 2021 Innovative Breakthrough in Mobile Technology Award

Huawei won the GTI 2021 Innovative Breakthrough in Mobile Technology Award for its 5G Super Uplink solution, recognizing Huawei's innovations in 5G technology and drive to advance the 5G industry.

The 5G Super Uplink solution unleashes the full potential of high and low frequency bands through TDD and FDD collaboration, and by enabling innovative time- and frequency-domain aggregation, it offers an enhanced uplink experience. This solution eliminates the uplink speed bottleneck to deliver higher upload rates and improved image quality for popular services such as streaming and gaming. This capability is becoming essential for the success of 5G in vertical industries, enabling high-bandwidth applications in ToB industries, such as smart mining, smart healthcare, remote control in smart factories, and machine vision.

Based on 3GPP specifications, the solution builds a healthy E2E ecosystem for 5G terminals, chipsets, network devices, and vertical industries to scale up 5G deployment and economic benefits. Numerous commercial terminals, such as Huawei Mate 40, Honor V30, and Nova V7 mobile devices already support Super Uplink, and the MKT chipset has completed the IoDT test for Super Uplink in 2020. To date, multiple operators have deployed the Super Uplink solution on their networks, realizing a 20% to 500% increase in the uplink speed while also improving cell-edge uplink coverage and indoor uplink experience. This solution is widely used commercially by operators and vertical industry partners in scenarios such as factories and ports.

GTI plays an important role in building a global 5G industry ecosystem — with C-band as the core — to advance 5G E2E maturity and promote cross-industry convergence and innovation. Huawei is a staunch and trustworthy supporter of GTI in fulfilling this role. 2021 will be a critical year in achieving sustainable development of the 5G industry. As such, Huawei will continue to work with GTI and other global partners to build a robust and sustainable 5G ecosystem, deliver ultimate performance and experience to users, and grow space for industry digitization.

ZTE President Xu Ziyang: Build Stronger Core Competence, Achieve High-Quality Growth Together

ZTE Corporation announced that the company's President Xu Ziyang has delivered a keynote speech entitled "Build Stronger Core Competence, Achieve High-Quality Growth Together" at the opening ceremony of the Mobile World Congress (MWC) Shanghai 2021, which kicked off on 23rd February 2021 in Shanghai, China.

According to Mr. Xu, 5G is still in its fledgling stage, and digital and intelligent transformation has already gathered full momentum. ZTE maintains the judgement that development in this stage will encounter both technology challenges and business uncertainties. Technology challenges include constantly reducing costs and increasing efficiency for 5G infrastructures, and meeting higher performance requirements for different industry applications.

To cope with technology challenges, ZTE builds stronger core competence and pursues excellence.

Challenges brought by business uncertainties refer to a series of problems that are not clearly understood, for example, the large-scale expansion, monetization, and business models of industry applications.

Facing uncertainties in market expansion, ZTE strengthens "agile" capabilities to promote the digital and intelligent transformation of vertical industries, thus lowering startup costs, making quick trials and iterations, and promoting successful models. Meanwhile, ZTE welcomes deep and open cooperation with our partners in vertical industries and the ecosystem, to achieve high-quality growth together.

Here comes the highlights of the speech:

Digital and Intelligent Transformation in Full Swing: After two years of commercial practices, 5G is still in its fledgling stage, and digital and intelligent transformation has already gathered full momentum. We maintain the judgement that development in this stage will encounter both technology challenges and business uncertainties.

For Technology Challenges, Build Stronger Core Competence and Pursue Excellence: To cope with technology challenges, we build stronger core competence and pursue excellence.

Ultimate Experience: To cope with the technology challenges, we make continuous innovations and breakthroughs for the ultimate user experience. For both consumer and business markets, the key to success is to create a brand-new experience for customers and users.

Ultimate Efficiency: Moreover, we constantly pursue ultimate efficiency, including the highest spectral, power, and network operational efficiency. These are vital for operators to reduce costs, improve efficiency, and achieve sustainable development.

Ultimate Core Competence: Core competence is the cornerstone of ultimate experience and ultimate efficiency. In terms of chipset, advanced manufacturing technology, packaging, and joint software/hardware design can help overcome the bottleneck of Moore's Law.

Focus on Value Creation and Scenario-Based Services Make things EASIER: When facing the challenge of business uncertainties in vertical industries, we advocate being value-driven and scenario-based to make things "EASIER".

Strengthen Agility, Succeed in Edge: Agility makes success. With lightweight and flexibility as its basis, agility is key to addressing uncertainties. As vertical industry applications extend to the OT field, the edge will become the major field for innovation incubation and application.

Fast Iteration, High-Quality Growth: To tackle uncertainties, we need comprehensive enhancement and coordination in all fields to achieve "full decoupling", "dual circulations", and "deep optimization".

Digital and Intelligent Ecosystem of Shared Success: Rainforests are the most stable and robust ecosystems on this planet. Striving for stronger core competence and high-quality growth in the 5G era, ZTE expects to build a rainforest-like ecosystem with all partners in the industry for shared success.

Nokia and AWS to Enable Cloud-based 5G Radio Solutions

Nokia announced in middle March that it has signed an agreement with Amazon Web Services (AWS) to research and enable Cloud RAN (vRAN) and Open RAN technologies to support the development of new customer-focused 5G solutions. The collaboration, which will be conducted at Nokia's facilities, aims to develop innovative proof of concepts (PoC) to explore and enable Cloud RAN and related technologies. Nokia is pursuing a strategy of collaborating with AWS to extend the reach of its Cloud RAN technologies in support of 5G deployments and the development of new use cases.

The initiative will see engineering teams from both companies research how the combination of Nokia's RAN (Radio Access Network), Open RAN, Cloud RAN and edge solutions can operate seamlessly with AWS Outposts. This collaboration will enable communications service providers (CSPs) and enterprises with 5G connectivity to utilize AWS across the topology of the mobile network. Operators will be able to simplify the network virtualization and platform layers for the Core and RAN network functions by leveraging the agility and scalability of cloud. This will also enable enterprises to achieve their desired business outcomes for new 5G use cases developed by AWS ISV Partners.

AWS offers its customers a comprehensive suite of on-demand cloud computing platforms and APIs on a pay-as-you-go basis. This collaboration will allow Nokia to leverage AWS services such as Amazon Elastic Compute Cloud (Amazon EC2), Amazon Elastic Kubernetes Service (Amazon EKS), AWS Outposts, AWS Local Zones, and other related services for automating network functionality, or end customer application deployment, scaling, and management.

Nokia and Google Cloud Partner to Develop New, Cloud-based 5G Radio Solutions

Nokia announced a partnership with Google Cloud to develop new, cloud-based 5G radio solutions. The two companies will collaborate on joint solutions combining Nokia's Radio Access Network (RAN), Open RAN, Cloud RAN (vRAN) and edge cloud technologies, with Google's edge computing platform and applications ecosystem. The collaboration will lead to the development of solutions and use cases to solve key 5G scenarios for businesses worldwide.

The initial collaboration, which is already underway at Nokia's Espoo headquarters, will pursue a number of different workstreams. The first, which will focus on Cloud RAN, will integrate Nokia's 5G vDU (virtualized distributed unit) and 5G vCU (virtualized centralized unit) with Google's edge computing platform, running on Anthos. Nokia's 5G standalone network with vCU and 5G core will also be tested on Google Cloud Anthos platform as a cloud-native deployment.

Today, global CSPs can unlock new monetization opportunities by driving 5G connectivity and advanced services to enterprise customers at the network edge, to deliver new, digital experiences for consumers. By leveraging its Open RAN and Cloud RAN leadership and combining it with best-in-class public cloud infrastructure from Google Cloud, Nokia is expanding its ecosystem of partners and helping CSPs lower deployment and operational costs, which is essential for monetizing 5G deployments. Both Nokia and Google Cloud will continue to develop the scope of these initial collaborations by exploring new technologies and solutions that will enhance their joint 5G Cloud RAN and edge cloud solutions.

Continuous 5G Evolution for Building an Engine of All-Industry Digitalization

At the 5G Advanced Summit hosted by the Global System for Mobile Communications Association (GSMA) during MWC Shanghai 2021, Dr. Tong Wen, Huawei Fellow and CTO of Huawei Wireless, emphasized that 5G must continuously evolve to build an engine of all-industry digitalization so as to satisfy the fast-growing consumer connections and diverse industrial applications.

5G Development Accelerates, Driving 5G Networks to Improve Performance

In the past year, 5G has been evolving at a faster rate, showing its massive potential. The continuous improvement of experience in customer connections and enrichment of Internet of Things (IoT) services raise the requirements on connection capabilities. "The ever-increasing demand for wireless connections is the fundamental driving force to continuously advance mobile technologies," said Dr. Tong.

Therefore, 5G must constantly improve its capabilities. Enhanced Mobile Broadband (eMBB) services are driving a significant upsurge in data demand, requiring 5G networks to increase capacity to guarantee premium experience. With the introduction of reduced capability (REDCAP), massive Machine-Type Communications (mMTC) services will be available on more terminals to fulfill the massive diverse IoT requirements. Ultra-reliable low-latency communication (URLLC) services require networks to reduce transmission latency and provide latency-guaranteed connection services so as to meet the high-quality connection requirements of remote and programmable logic controller (PLC) control.

5G Must Expand Its Boundary of Capabilities to Open up a New Space of Business

As new applications keep emerging in the market, the three use cases originally defined in 5G need enhancement to meet diverse IoT service requirements. The boundary of 5G capabilities must be expanded to open up a new space of business.

Immersive interaction services are rapidly developing. 5G AR/VR has enabled superior virtual experience. With the rise of lightweight XR devices, 5G XR will also become a reality. This requires 5G to be further enhanced to deliver premium immersive experiences. 5G networks will be required to increase its average speed from 120 Mbps to 2 Gbps as high definition improves from 4K to 16K. To ensure real-time interaction in the virtual world, 5G must also further reduce transmission latency from the current 20 ms to 5 ms.

Uplink-centric networks are accelerating industrial digitalization. Currently, 5G applications are growing at an unprecedented rate, raising the requirements on uplink speeds. Various consumer AR/XR services require high-definition images and videos to be sent from local devices to clouds for further rendering. Remote control and machine vision in industrial applications also require real-time transfer of 4K and 8K videos. This will lead to a considerable increase in the proportion of uplink traffic over 5G networks to above 40%. To deal with such a huge amount of uplink traffic, 5G uplink capabilities must be improved by at least 10 times.

In addition, 5G must provide sensing capabilities to empower remote control, vehicle-road synergy, unmanned transportation, and smart logistics. For example, by introducing cellular Massive MIMO's beam sweeping to sensing technologies, both sensing and communication, and even indoor high-precision positioning services, can be implemented through wireless technologies.

5.5G Will Become an Engine of All-industry Digitalization

Based on its abundant practices while helping realize the prospects in the mobile industry, Huawei has proposed 5.5G to contribute to exploring new applications, including uplink centric broadband communication (UCBC), real-time broadband communication (RTBC), and harmonized communication and sensing (HCS), with the aim to build an engine of all-industry digitalization.

Nokia and CMCC Trial AI-powered Radio Access on Live 5G Network

Nokia and China Mobile (CMCC) announced in January that they have successfully completed live trials of an AI-powered radio access network (RAN) over CMCC's network. Utilizing CMCC's 4G and 5G networks, the companies completed an AI-based real-time user equipment (UE) traffic bandwidth forecast trial in Shanghai as well as a network anomaly detection trial in Taiyuan, the capital city of China's Shanxi province.

During the trial, China Mobile introduced its "i-wireless-intelligent and simplicity 5G network" concept, a series of technologies designed to create a greener, smarter, and more efficient 5G network. The near-real-time RAN Intelligent Controller (RIC) is one of these technologies and a new network element that enables near real-time control and optimization of RAN elements enabled by real-time data exposure and cross-layer perception capabilities utilizing AI and ML applications.

In the trial, the RIC was included in the edge cloud using Nokia's AirFrame Open Edge server platform. The RIC platform enables increased network optimization capabilities through policy-guided, closed-loop automation. These are fundamental to further advance the 5G RAN architecture, enabling a wide range of intelligent, real-time data-driven, network automation, and optimization applications.

In Shanghai, the trial confirmed that AI-based real-time user equipment (UE) traffic prediction accuracy exceeded 90 percent in a live 5G network test. This was achieved by estimating the UE radio quality and related throughput for 100 milliseconds. With the real-time RAN data exposure capability, Nokia's 5G AirScale base station was able to send UE radio quality information to the RIC in real-time, which is critical for the accuracy of the predictions.

Nokia and CMRI worked together to design the trial solution. The trial's test specifications were defined by the China Mobile Research Institute (CMRI), Shanghai Mobile, and Nokia.

Nokia, Shanxi Mobile and the China Mobile Research Institute (CMRI) also trialed network anomaly detection technology. The trial examined network operation automation using CMCC's 4G/5G network across more than 10,000 cells. With the AI/ML technology assistant, network problems were detected more accurately and automatically. The AI/ML-powered anomaly detection solution can drastically decrease the time needed to analyze issues and find the root cause. For operators, it represents a cost saving of more than 70 percent on human resources required to process the issues. Nokia's anomaly detection platform software (SW) architecture offers a distributed and split SW architecture and is suitable for non-real-time and near-real-time RIC deployment.

Huang Yuhong, Deputy Director of China Mobile Research Institute, said: "RIC plays a key role in enabling AI/ML capability in the RAN, which is of great significance to realize the concept of the 'i-wireless-intelligent and simplicity 5G network'. Nokia and CMCC's trials are very meaningful for RIC commercialization. China Mobile has put effort into the AI-assisting RAN network technology. We are pleased to complete these trials using AI to forecast UE transmission bandwidth and detect anomalies on CMCC's live network with our partner Nokia. The field trial proved the availability of RIC enabling network enhancements through customized real-time BTS data analysis and control."

Pasi Toivanen, Head of Edge Cloud Platforms BU at Nokia, commented: "We are excited to have worked with China Mobile on this project to advance RAN network intelligence. We believe it will be a key asset in improving the wireless network efficiency and the experience of its subscribers. This is an example of Nokia's commitment to supporting our customers in the delivery of world-class network performance."

ZTE Implements Africa's First 3G/4G/5G Tri-RAT Dynamic Spectrum Sharing Solution

ZTE Corporation announced on 7th April that it has implemented Africa's first live 3G/4G/5G Tri-RAT dynamic spectrum sharing solution, ZTE's SuperDSS, in South Africa.

ZTE's 3G/4G/5G SuperDSS field trial was implemented on 2.1GHz spectrum within 15MHz bandwidth, compared with the current static spectrum allocation solution of 3G and 4G.

According to the trial results, the SuperDSS solution allowed the fast introduction of 5G on the 2.1GHz spectrum, and simultaneously increased the 4G single user average throughput by 39.85%, without negatively affecting the existing 3G and 4G major KPIs and user experiences.

ZTE has been committed to exploring the feasibility of spectrum sharing solutions at various stages of network development for a long time. ZTE's SuperDSS is a 5G evolution networking design oriented solution. It assists operators to build a lean multi-mode and multi-service network, supporting 5G and protecting their legacy investment.

In the process of network evolution, 3G/4G/5G traffic-based dynamic spectrum sharing can maximize spectrum utilization, with more bandwidth being allocated for LTE and NR based on UMTS bandwidth change on demand. Besides, traditional voice service is also guaranteed.

Anritsu MT8000A and MediaTek M80 5G Modem Achieve over 7Gbps Downlink Throughput with FR1+FR2 Dual Connectivity

Anritsu Corporation is pleased to announce that its Radio Communication Test Station MT8000A successfully achieved a downlink (DL) throughput over 7 Gbps using FR1+FR2 Dual Connectivity (DC) technology and 256QAM modulation in 5G Standalone (SA) mode in conjunction with MediaTek's latest M80 5G modem. This industry-first achievement demonstrates Anritsu's commitment to contribute to the development and wider rollout of new 5G services, which, through its collaboration with MediaTek, verifies leading-edge 5G technology features.

Together MediaTek and Anritsu have been focusing on development and testing of both FR1 and FR2 technologies and functions. Increasing data throughput based on FR1+FR2 DC and 256QAM has been one of the latest successes in this ongoing partnership.

FR1+FR2 DC combines FR1 and FR2 technologies to improve data throughput per user by grouping cell base stations with different frequency ranges to transmit data; the 256QAM modulation technology uses advanced RF and signal-processing technologies to support faster communications by sending 8 bits of data in a single symbol.

Increased data throughput has been a key factor in facilitating rich mobile services, and the combination of FR1+FR2 DC technology with 256QAM supporting DL throughput speeds greater than 7 Gbps represents an important milestone in future growth of 5G services. Anritsu, in partnership with MediaTek, will continue to play a proactive role in future development of leading 5G communications technologies.

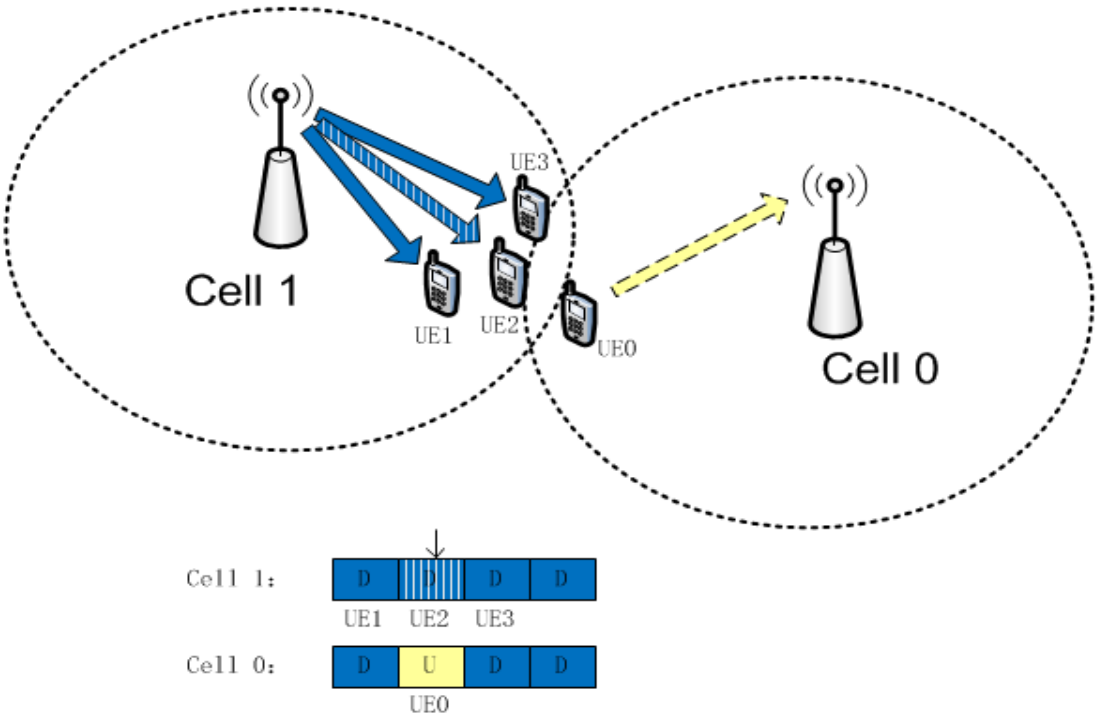
"Anritsu's powerful test platform has helped prove the technology-leading capabilities of the MediaTek M80 5G modem," said JS Pan, General Manager of Wireless Communication System and Partnership at MediaTek, "Our continued partnership with Anritsu will lead to early development and faster time to market (TTM) for our global 5G mobile devices."

On achieving this joint test result, Takeshi Shima, President of Test & Measurement Company, Anritsu Corporation said, "By offering our leading test solutions, Anritsu is happy to have assisted MediaTek in development of its market-leading 5G products. We look forward to continuing our future partnership with MediaTek in clearing the path for advanced 5G to contribute to building a happy and rich global culture through new wireless technology."

CICT and China Mobile Complete 4.9GHz Cross-Slot Interference Test

In June 2020, CICT and Gansu Branch of China Mobile jointly conducted a large number of joint technology research and development in Lanzhou city for the cross- slot interference technology. So far, key technical research has been completed, which lays the foundation for the commercialization of 4.9GHz technology.

With the development of 5G networks, there will be a lot of the "downlink high-rate scenario" and the "uplink large-capacity scenario" at one area. When these two kinds of scenarios are located in intra-frequency neighbor cells, cross-slot interference will occur. Slot interference may cause a decline in 5G network performance. Such interference should be avoided as much as possible in commercial network.



China Mobile and CICT jointly completed the evaluation test of cross-slot interference impact under different 4.9GHz frame structures. This test verified the interference effect in different site configuration, which gives a good suggestion to operators for network construction evaluation. At the same time, this test also verified the effect of avoiding cross-slot interference such as power isolation, time slot shutdown, and space isolation. Each scheme's suppression effect on interference can reach about 10%, which improves the service quality.

In the 5G era, there are more and more uplink demands especially in 2B scenario, which means 3U1D frame structure, may be widely used to increase the uplink data transmission capacity. The 4.9GHz cross-slot interference test provides operators with some solutions for better user experience.

Wireless Foundation Summit @MWC Shanghai: Strengthen LTE Foundation to Maximize 5G Potential

The senior executives at the Wireless Foundation Summit held at MWC Shanghai 2021 discussed how to build the wireless foundation network of the future, which has to be powerful, simple and efficient to support a profitable business for mobile operators.

Data from GSMA Intelligence forecasts in four or five years 4G will account for as much of half of total mobile connections, which means LTE networks will continue to support the majority of data traffic in many countries for at least another decade as it remains the underlying pillar for the user experience. For nations yet to roll out 5G, LTE coverage will be even more important, since it is the foundation for mobile broadband connectivity.

Anritsu and Spirent Develop World's First Solution for Evaluating 5G Video Quality

Anritsu Corporation is pleased to announce availability of a new solution for evaluating video quality of 5G devices. This lab-based solution was developed in partnership with Spirent Communications plc (LSE: SPT), and leverages the strengths of Anritsu's SmartStudio NR Network Simulator and Spirent's Umetrix Video software, providing the world's first integrated 5G video quality system.

Integrated Solution

This solution integrates Anritsu's Radio Communication Test Station MT8000A and SmartStudio NR (SSNR) control software with Spirent's Umetrix Video system for evaluating video quality.

The MT8000A operates as a 5G Call Box by simulating a 5G base station and core network using a state-machine-based GUI. Users can simulate a full range of 5G network conditions including both Standalone (SA) and Non-Standalone (NSA) topologies at FR1 or FR2 frequencies, all without creating protocol scripts. Testing of throughput, mobility, VoNR, EPS-Fallback, SMS, CMAS, CDRX, and other functions can be easily performed using SSNR's GUI.

SSNR's flexible network settings as well as its simple reproduction of a live 5G network environment facilitate easy and effective analysis of video quality. Moreover, support for many APIs accelerates configuration of customer's automation environments.

Spirent's Umetrix Video evaluation system measures the receive-side quality of streamed video contents by scoring QoE (Quality of Experience) using Video Mean Opinion Scoring (V-MOS) from only receive-side. It supports video-streaming services and video-content analysis by scoring the original video without prior display, facilitating faster and lower-cost repeatable design tests, regression tests, and competitor benchmarking.

Nokia, Key Bridge Wireless Introduce Integrated CBRS Offering for CSPs, MSOs and Enterprise Private Wireless

In late March, Nokia announced a fully integrated CBRS solution aimed at enabling communications service providers (CSPs), multiple-system operators (MSOs) and enterprises to take full advantage of their investment in CBRS spectrum.

The new offering complements Nokia's portfolio of FCC-certified CBRS radio and devices, and adds to its leading range of industrial-grade 4.9G/LTE and 5G private wireless networking solutions.

Designed to accelerate CBRS private wireless deployment, it is the most comprehensive solution in the marketplace for CSPs, MSOs and enterprises to deploy reliable CBRS networks quickly and easily.

The solution consists of Key Bridge Wireless FCC-certified Wave 1 SAS/ESC coupled with Nokia CBRS radios, user devices and new Domain Proxy. The Nokia and Key Bridge Wireless partnership, incorporating shared spectrum technical innovations from Nokia Bell Labs, provides the highly reliable SAS service required to operate in CBRS General Authorized Access (GAA) and Priority Access License (PAL) spectrum.

The integrated Key Bridge Environmental Sensing Capability (ESC) in the solution can be selectively densified in areas with high-value industrial sites and enterprises to enable ultra-reliable CBRS spectrum availability information. Combined with distributed, geo-redundant SAS and Domain Proxy, this enables enterprises to operate ultra-reliable radio access networks in CBRS spectrum, especially high-value PAL spectrum.

VoLTE: The Foundation of 5G Voice Services Will Unleash the Power of Voice

At the "Huawei VoLTE Pro Summit" that took place alongside the recent Mobile World Congress Shanghai, telecoms professionals delivered a strong message that calls for stakeholders in the mobile industry to embrace voice-over-LTE (VoLTE) as quickly and as broadly as they can, to reap the rewards of the advances in mobile telecoms technologies.

VoLTE has made great strides in supporting mobile operators throughout the world to migrate users from 2G and 3G to 4G and 5G, not the least thanks to the technology's advantages in higher voice quality and voice-data concurrence capability. As a result, operators are able to gradually sunset their 2G and 3G networks, and to re-farm the frequencies and cell sites used by 2G and 3G for new mobile generations.

In his opening speech, Liu Kang, president of CCN at Huawei, also highlighted the uneven development of VoLTE across markets, but he believed the key advantages of VoLTE would be able to drive broader adoption of VoLTE in the near future. These include its capability to deliver voice as data packets over LTE's data bearer, therefore enabling operators to simplify network operations by switch off 2G and 3G. VoLTE's voice-data concurrence capability enables more innovative and richer voice services, therefore creating new value for operators. However, probably the most critical role VoLTE can play and its biggest opportunity in the coming years is its future-proof role for 5G voice.

Huawei hopes to lead the industry into a "VoLTE Pro" era, which will make VoLTE the foundation for 5G voice call with richer and more innovative experience, help optimize LTE coverage, and deliver IMS-based service over 2G and 3G networks.

ZTE and China Mobile Upgrade Xinfengming Group's 5G Intelligent Manufacturing

ZTE Corporation, in partnership with China Mobile, has upgraded Xinfengming Group's 5G intelligent manufacturing, following the completion of the test and verification of the "i - wireless 5G intelligent and one-stop local network" project.

Leveraging ZTE's NodeEngine solution, this Xinfengming 5G manufacturing platform has been upgraded to accelerate the comprehensive digital transformation. This is the first commercial deployment of NodeEngine solution by ZTE and China Mobile.

Aiming to better serve manufacturing with 5G technologies and to offer enterprises with flexible and fast local services, ZTE, China Mobile Research Institute and the Zhejiang Branch of China Mobile have teamed up to provide industrial parks with the innovative solution, featuring functions of PRB resources reserved hard slicing, intelligent and simple local distribution, EdgeQoS service management and control, and enterprise self-service portal and more, based on the concept of i- wireless 5G intelligence and simplification. The NodeEngine solution is simple to deploy, quick to commission and excellent in performance and cost effectiveness.

The World's First 5G Indoor Positioning — Verified by China Mobile Suzhou and Huawei

China Mobile Suzhou and Huawei reached a new milestone with the verification of the 5G indoor positioning capability in metro transport scenarios in Suzhou — a major city located along the southeastern edge of Jiangsu Province in eastern China. The verification showed that, even with pRRUs being hidden, a positioning precision of 3 to 5 m can be achieved in 90% of the platform and hall areas. This is the first time that 5G indoor positioning has been verified on live networks in the world, providing valuable experience for the commercial growth of 5G positioning in vertical industries.

Indoor location-based services are in high demand of vertical applications, such as indoor navigation, asset tracking, geofencing, logistics management, and personnel management, which reflects the huge market space of indoor positioning. Currently, indoor positioning technologies are of great variety and most of them need to be deployed and maintained individually, resulting in high end-to-end costs. As a part of the continuous evolution of 5G, positioning has been added to 3GPP Release 16 finalized in mid 2020 to realize indoor positioning by leveraging the ultra-high signal resolution empowered by 5G's high bandwidth, multi-point measurements, and multi-access edge computing (MEC) deployment.

The verification was based on Huawei's 5G digital indoor solution LampSite and leading MEC solution. The LampSite units measure the radio signals of 5G devices and work with MEC to analyze the signal characteristics. Based on the results of the analysis, leading algorithms are used to precisely locate 5G devices.

Counterpoint Whitepaper Release: Global NB-IoT Ecosystem: Trends, Adoption and Outlook

Wireless IoT (internet of things), specifically LPWA (low-power wide-area) technology, continues to drive digital transformation and enhance real-world experiences, addressing consumer comfort and convenience while leading to energy and operating efficiency improvements across a host of industry segments.

NB-IoT (Narrow-Band IoT) is staking its claim as the LPWA technology of choice, with certain characteristics making it preferable to other technologies.

Key Drivers:

- **Widespread mobile operator support.** There are currently 106 live NB-IoT networks globally, and with over 100 mobile operators planning to shut down 2G and 3G networks over the next few years, 2G M2M migration will be a major catalyst in driving NB-IoT uptake. Looking further ahead, NB-IoT is a key part of 5G specifications in upcoming 3GPP releases, making it a future-proof investment.
- **Strong industry support.** NB-IoT has a thriving ecosystem of major chipset vendors, hardware manufacturers and equipment providers. Hundreds of companies are increasingly active across all aspects of the NB-IoT value chain – from components and devices through to platforms and analytics.
- **More use cases.** NB-IoT technology is proving its value in a growing number of sectors, from Smart City and Consumer applications, through to Industry and Agriculture. And with improvements added by 3GPP Release 14, NB-IoT is increasingly supporting mobile applications.

NB-IoT represents a significant opportunity for mobile operators to create new revenue streams beyond the exceedingly competitive consumer segment. By moving further up the value chain beyond connectivity into areas such as IoT software/platforms and analytics, operators stand to capture a larger share of the IoT market and diversify across more industries.

Huawei's Gan Bin: 1+N, Innovating for a Mutually Beneficial Future

During the MWC Shanghai 2021, Huawei released its latest products and solutions. Mr. Gan Bin, Vice President of Huawei Wireless Product Line, delivered a keynote speech titled "1+N, Innovating for a Mutually Beneficial Future" and unveiled a full series of products and solutions for building 1+N 5G target networks. These products and solutions will provide global carriers with leading 5G network capabilities, enabling them to create greater value. Mr. Gan said that these products and solutions are further innovated and upgraded based on scenarios to help carriers continuously develop differentiated network advantages on 1+N target networks and implement 5G ultimate capabilities.

The vision for "1+N" 5G target network is twofold: one foundation network and N differentiated capabilities. The foundation network that ensures high bandwidth and ubiquitous coverage is the first step to achieve this vision. More than 140 5G commercial networks have been constructed worldwide so far, 80% of which use TDD Massive MIMO technology. Based on years of exploration into Massive MIMO capabilities, Huawei has helped global carriers consolidate their leading positions in cell capacity and user experience. Meanwhile, facing severe challenges of insufficient space for installing new antennas, exploring discrete spectrums, and achieving TDD-free high bandwidth, Massive MIMO products and solutions are required to improve engineering capabilities. In this context, Huawei has launched a number of Massive MIMO innovations to help carriers achieve commercial deployment across full scenarios.

Nokia and TV Azteca Trial 5G Connectivity for TV Broadcasting

Nokia announced the completion of a trial with TV Azteca in Mexico that examined video transmission use cases using 5G standalone and edge computing. The trial explored latency reduction, as well as identifying improvements in efficiency, flexibility and cost.

The trial was carried out using 100 MHz spectrum in 3.5GHz frequency with Nokia 5G technology for core and radio access (RAN). TV Azteca – part of Grupo Salinas, and the second-largest media producer in the world – tested the transfer of raw HD/4K video from cameras to the encoding server of TV Azteca, for its subsequent distribution without the need for additional infrastructure.

This application demonstrated the potential of new applications for TV coverage in smart stadiums, as well as leveraging edge computing platforms to host augmented reality (AR) services or run event-related analytics.

Tests also showed that 5G connectivity enabled more agile camera deployment and repositioning during live events, resulting in a more dynamic viewing experience. The test also demonstrated the feasibility of other use cases that benefit from the flexibility of video streaming, including improved operations communication, security, fleet monitoring, and automation in industries such as retail, manufacturing, mining, oil and gas.

ZTE Wins the Privacy Strategy Contribution Award from BSI

ZTE Corporation, a major international provider of telecommunications, enterprise and consumer technology solutions for the Mobile Internet, announced that it has been awarded the Privacy Strategy Contribution Award by BSI at the 3rd Smart Summit Economic Forum, in recognition of its outstanding contributions to privacy protection and compliance.

The forum has invited nearly 300 representatives from well-known enterprises, research institutions, industry associations and government departments, and is available through live streaming.

BSI, a 100-year organization in UK with a royal charter and one of the founding members of the International Organization for Standardization (ISO), selects the 2020 Excellence Award in terms of three dimensions: Advanced Performance, Privacy Strategy and Corporate Social Responsibility (CSR).

“ZTE stands out among many enterprises with ISO27701 certification, and wins the Privacy Strategy Contribution Award, which reflects great recognition from professional certification organizations for ZTE's privacy protection,” said Shen Nan, Chief Legal Officer of ZTE. “By implementing high standards, the company has been committed to embedding privacy protection into business activities and product design, expecting to strengthen the basis of mutual trust between ZTE and its global partners for the promotion of a win-win situation between both parties.”

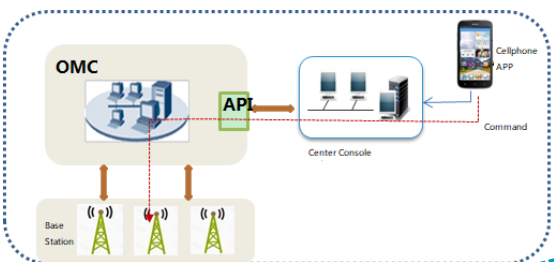
CICT Provides Mobile APP to Promote Base Station Setup

The development of 5G network proposes the requirements for the quick base station setup. The traditional base station setup requires manual labor, data production and step-by-step confirmation of the operation process. Manual methods are not only complicated but also error-prone.

In order to improve the efficiency of site setup, Fujian Branch of China Mobile and CICT jointly proposed the "One-key remote automatic setup of 5G base stations".

First, based on the original SON self-starting technology architecture, CICT adjusted the automatic start-up process of the base station: data production, software upgrade, configuration data update and progress monitoring process. And the northbound interface opened by the network management system connects to the base station system "Center Console” of FuJian Mobile . Then the mobile APP can send the command to the base station system “Center Console” of FuJian Mobile . Finally, the 5G base station is automatically set up remotely through the mobile APP. This system can achieve base station network planning and base station automatic setup.

The automatic configuration setup of the site not only improves the success rate of site setup, but also greatly saves cost and time. Cost of site setup can be reduced by 40%. And the time needed by setup the base station can be within 40 minutes. At the same time, in the event of sudden accidents or natural disasters, network communications can be quickly restored by this solution. In the future, CICT will collaborate with China Mobile to construct much better and lower cost 5G networks in more quick ways.



CMPak and Huawei Conduct Pakistan's First Commercial Use of Smart 8T8R

Zong 4G has successfully implemented Pakistan's first Smart 8T8R in collaboration with Huawei Technologies. The implementation was done on CMPak's (Zong's) existing 4T4R network, which was upgraded to Smart 8T8R in Lahore. This technological advancement has increased the capacity by 1.8 times, improving the user experience by folds.

The continued development of mobile web applications, high-definition (HD) video streaming, and online gaming services pose challenges to the MBB network in Pakistan. To meet this continuous growth in demand and ensure a smooth 5G evolution, Smart 8T8R provides the right solution.

The Smart 8T8R solution incorporates software-defined antennas (SDAs), FDD dual-band RRUs, and Huawei's innovative algorithms. With one-time hardware deployment, it enables software upgrades on demand, capacity increase for 4G, and smooth upgrade to 5G, providing a better choice for operators to build FDD networks with NR smooth evolution.

This solution will promote fast NR evolution of the FDD network and set a new standard for future MBB network benchmarks.

"CMPak provides premium service experience through leading technologies," shared Mr. Wang Hua, Chairman and CEO Zong 4G. "The use of Smart 8T8R enhances user experience and protects future network investment, as well as diversifies the options for developing networks and services."

Nokia Launches Nokia Edge Automation to Manage Multiple Cloud Deployments Supporting New 5G Use Cases

Nokia announced the launch of Nokia Edge Automation, a new solution that removes the complexity of managing multiple cloud-based data centers by automating the process from a single platform. Nokia's fully automated edge cloud solution drives operational efficiencies by enabling Communication Service Providers (CSPs) to simultaneously control infrastructure across numerous geographic locations. This includes remote site deployment, software updates, and maintenance. Automation is expected to save on CSP operating costs by approximately 30 percent.

As operators move to cloud-based solutions they face operational issues such as having to manage hundreds of independent cloud solutions deployed across multiple sites. Nokia Edge Automation tool simplifies the management of this process by enabling edge data planning integration, automated deployment, and mass software upgrades for any edge cloud infrastructure. It also manages the life cycle of edge site infrastructures and supports on-premises deployments for enterprise customers. The solution supports site deployments by remotely detecting, configuring and updating site hardware, switches and servers, based on the site plan. It can also upload, install and configure on-site cloud stacks, verify site deployments and configurations, as well as trigger application deployments.

Together with the Nokia AirFrame Data Center Manager, a management system for optimizing and automating data center operations and resource utilization, the Nokia Edge Automation tool manages the life cycle of edge site infrastructures. Automation tools can be applied to multiple hardware and cloud stacks and provide open APIs for integration with existing operational tools.

ZTE Releases 5G Messaging Technical White Paper

ZTE Corporation has released the ***5G Messaging Technical White Paper***, which fully elaborates on ZTE's 5G Messaging solution. The white paper aims at building the 5G killer service, to better serve the public and thousands of industries.

The messaging service is the basic service for operators. ZTE, by virtue of its 5G network technologies, took the lead in proposing the 5G Messaging solution. With the advent of the latest technological evolution, standard development and terminal development of 5G networks, 5G Messaging is divided into three categories of messaging services:

5G Short Message Service (SMS): According to the 3GPP technical standards and terminal capabilities, the 5G networks and terminals will support SMS over NAS(Non Access Stratum), which is an SMS function based on 5G NR access. The 5G SMS still provides the basic SMS services, with the functions and experiences being the same as those of the traditional SMS.

5G Rich Media Messaging: For a long time, the functions and experiences of the traditional text messages cannot satisfy the requirements of users, and restrict the development of industry applications. In the 5G era, the traditional text messaging is upgraded to GSMA UP2.4 with 5G rich media messaging and business messaging services, to complete a comprehensive upgrade of its functions, features, experiences and services.

5G Internet of Things (IoT) Messaging: With 5G IoT Messaging standards and technologies that feature massive connections, low bandwidth, and lightweight, 5G IoT Messaging has achieved the messaging communication and commercial applications among objects, people and applications.

Single Voice Core - Best Choice Facilitating Voice Network Evolution

At MWC Shanghai 2021, Huawei officially released a 5G voice solution, Single Voice Core, helping operators improve voice quality and build a cloud-based 5G voice network.

Voice calls have always been considered as one of the most reliable means of communication. As protocols stipulate that voice calls cannot fall back from 5G to 2G/3G networks, the IMS-based VoLTE network was set as the basic voice network following the commencement of 5G. As such, operators must invest in and operate multiple networks, causing inconsistent service, cumbersome O&M, and other issues.

To better understand these challenges, a concept from the economic industry, the misery index, was introduced to tally network complexity. The misery index for an operator is determined by the number of networks, platforms, and NEs owned by an operator, as well as an O&M complexity factor. The larger the misery index is, the more cumbersome O&M is.

As a result, Huawei has proposed the Single Voice Core solution. This innovative solution adopts all-cloud IMS architecture and aims to integrate CS and IMS networks to simplify the network topology, inherit all basic CS services, and provide unified interfaces. With the Single Voice Core solution, media transcoding times and call forwarding times are reduced, improving voice quality, reducing hardware usage by 30%, and lowering OPEX by 40%. In addition, the integrated network supports access of and offers services for 2G, 3G, 4G, 5G, and fixed-line subscribers. The Single Voice Core solution can reduce the misery index to 220 or lower, making it the best choice for operators to provide voice services with 5G.

Nokia and ClearWorld Partner for Smart City Applications

Nokia announced it has signed a reseller agreement with ClearWorld, an alternative energy systems provider, to sell ClearWorld's smart poles initially to U.S. cities and military bases as part of Nokia's smart city solutions portfolio. Deployed in locations such as parks, parking lots and roadways, the ClearWorld connected digital pole supports applications such as video analytics, Wi-Fi access points, gun shot detection, smart lighting and license plate reading.

Nokia's smart city solutions, based on Nokia Bell Labs Future X architecture, include intelligent, integrated city platforms that utilize 5G, industrial IoT and machine learning technologies to provide foundations for urban innovation. The partnership with ClearWorld for smart poles enables Nokia to be a comprehensive solution provider of smart urban infrastructure solutions for cities.

ClearWorld's smart poles provide a sustainable, resilient, and redundant power source to keep networks live through power outages and natural disasters. By leveraging a solar wrapped pole, ClearWorld is able to reduce utility operating and maintenance costs. These systems are designed to be utilized as a backup power source for networks and critical infrastructure. They also feature built-in IoT capabilities for a clean, aesthetic look that fits with city design. Nokia technologies such as 5G and 4G radios and G-PON can be deployed on the poles to provide citywide connectivity options, but also in association with the poles to power innovative IoT-based city services, using Nokia's IoT device management and analytics solutions.

Huawei and China Mobile Guangdong Pilot 5G Indoor Distributed Massive MIMO

Huawei and China Mobile Guangdong achieved a significant milestone with the pilot of their latest innovation: 5G indoor distributed Massive MIMO. This pilot was completed in the 2.6 GHz inter-frequency networking (80 MHz + 80 MHz) in Huawei's Southern Factory in Dongguan, an important industrial city in China's Pearl River Delta. The cell uplink throughput peaked at 1.2 Gbps, showing that this innovative solution can ensure high-quality uplink experience end to end for smart manufacturing applications.

The pilot was conducted using LampSite, Huawei's 5G digital indoor network product, based on the 2.6 GHz inter-frequency networking (80 MHz + 80 MHz). Distributed Massive MIMO was enabled in multiple 5G indoor cells to provide the large capacity needed to support 5GtoB services and meet their high requirements for uplink experience. The peak uplink experience was quadrupled compared with traditional 4T4R cells.

Indoor distributed Massive MIMO introduces Massive MIMO for macro base stations to indoor networks. It is an innovative approach by Huawei to continuously increase the capacity of indoor 5G networks. The technology supports up to 64T64R channels and pools beamforming, MU-MIMO, and other technologies to ensure high capacity in the uplink and consistent user-perceived data speeds. Such a high level of performance makes it perfectly for smart production in which service terminals are frequently relocated for flexible production. Adding another competitive edge to empower 5G to transform industries.

The pilot is of great significance to 5GtoB, providing carriers with a new option to ensure premium uplink experience for emerging industrial services, such as video transfer and AGV operations, and expand 5GtoB to factories, ports, power grids, airports, transportation, security, and many other industrial markets. Huawei will continue to work with China Mobile Guangdong in innovating 5G to improve 5G performance, build competitive 5G networks, and lead the development of 5GtoB.

ZTE Launches Intelligent Orchestration Radio Network Solution

ZTE Corporation has released its Intelligent Orchestration Radio Network solution, which employs an innovative AI-based intelligent orchestration engine to enable MNOs to achieve maximum value from 5G networks.

As a key infrastructure and technology for digital transformation, 5G is advancing the development of the digital economy to a new level: from online to offline, from consumption to production, from platform to ecosystem. With the development of 5G networks, the one-size-fits-all strategy of traditional wireless networks has been unable to meet the diverse needs of B2C and B2B services. To help tackle this challenge, ZTE releases the Intelligent Orchestration Radio Network solution, which can simultaneously and dynamically orchestrate network resources according to service and experience requirements, implement the best user experience and meet industry requirements in a more flexible and efficient way to unlock the full potential of 5G network capabilities and value.

During the first stage of implementing the Intelligent Orchestration Radio Network solution, scenario-based intelligent resource coordination is implemented based on user orchestration and network orchestration. User orchestration is based on learning and prediction of user behavior and service capacity, and evaluation of terminal capabilities to achieve precise navigation. This navigates users to the system and cell with the shortest delay and highest efficiency, thereby enabling delivery of the best 5G user experience. With the deployment of multi-frequency 5G networks, network orchestration can further realise 5G spectrum bandwidth in a dynamic maximum without affecting 2G/3G/4G services under the scenario of 4G and 5G resource competition with intelligent service diversion, guaranteeing the continuity of the 5G user experience.

Nokia Deploys First 5G Standalone RAN Sharing Network for M1-StarHub Joint Venture in Singapore

Nokia announced the first 5G standalone (“SA”) Radio Access Network (“RAN”) Sharing network in South East Asia. The company has been selected by Antina Pte. Ltd. (“Antina”), a joint venture formed by mobile network operators M1 and StarHub, following a competitive tender process, to deploy 5G SA networks across Singapore. The commercial deployment of a 5G SA network will introduce compelling new use cases and cater for the growing data demand in the country, putting Singapore at the forefront of 5G standalone technology in the region.

The partnership will enable Antina’s customers – M1, StarHub and other mobile service providers on wholesale arrangements – to benefit from a game-changing ultra-high speed, low-latency and highly secure 5G SA network that will reduce complexity and increase cost efficiencies. It will also enable new use cases across entertainment, cloud gaming, transportation, education and healthcare.

Nokia will provide equipment from its comprehensive AirScale portfolio and CloudRAN solution to build the Radio Access Network (RAN) for the 5G SA infrastructure, utilizing the 3.5GHz spectrum band. Nokia will supply 5G base stations and its small cells solution for indoor coverage, as well as other radio access products. Nokia’s 5G SA technology will provide Singaporean enterprises with the opportunity to explore multiple new use cases due to the network’s higher bandwidth, higher uplink speeds and lower-latency.

Alpha Wireless Equips Nextlink to Accelerate Broadband Internet Access across American Midwest

Alpha Wireless, a global leader in antenna solutions, is supplying 3.5 GHz-capable antennas to Nextlink Internet to enable delivery of broadband internet to underserved communities throughout the Midwestern U.S. The large-scale, private LTE network deployment using the Citizens Broadband Radio Service (CBRS) spectrum helps Nextlink reduce the costs of rural broadband provision while increasing performance and preparing for tomorrow's 5G networks.

Nextlink selected the Alpha Wireless family of antenna solutions to meet the stringent technical requirements of delivering high-speed, fixed wireless internet connectivity to families and businesses across largely rural areas in 11 states.

The multi-year Nextlink deployment includes the Alpha Wireless AW3161 3.5 GHz antenna working with Nokia radios in an LTE network that can be easily upgraded to 5G. The comprehensive Alpha Wireless family of CBRS-ready antenna solutions includes pseudo-omni, small cell, beamforming, concealment and tri-sector antennas proven to increase capacity and coverage over the past decade in existing deployments in the U.S., Canada, Ireland and Australia. With an innovative design that enables reduced tower footprint, faster roll-out, increased capacity and maximum coverage, the Alpha Wireless antenna solutions allow Nextlink to optimize performance and deployment speed while cutting operational costs.

Anritsu Upgrades Production-Line Inspections Efficiency for 5G Devices

Anritsu Corporation is pleased to announce the simultaneous February-19 launch of its TRX Test Module MU887002A for upgrading the production-line inspection efficiency for wireless communications devices, including 5G, and its space-saving Universal Wireless Test Set MT8872A.

With 24 RF connectors, the newly developed TRX Test Module MU887002A is a TRX module for installing in both the MT8870A and MT8872A. It supports 5G Sub-6 GHz New Radio (NR) RF tests as well as various other simultaneous wireless communications tests, including WLAN, Bluetooth®, GNSS, etc. As a result, it greatly upgrades the inspection efficiency of production lines for wireless communications devices.

The MT8872A is a measuring instrument for mass-production and is fully compatible with the MT8870A. Its small footprint supports use in narrower spaces than the standard 19" rackmount to save installation space on crowded production lines.

Anritsu expects these new MU887002A and MT8872A solutions to improve mass-productivity on wireless communication device production lines by both saving space and cutting costs.

TD-LTE & 5G Global Market Overview

Global Deployment as the Mainstream Mobile Broadband Technology

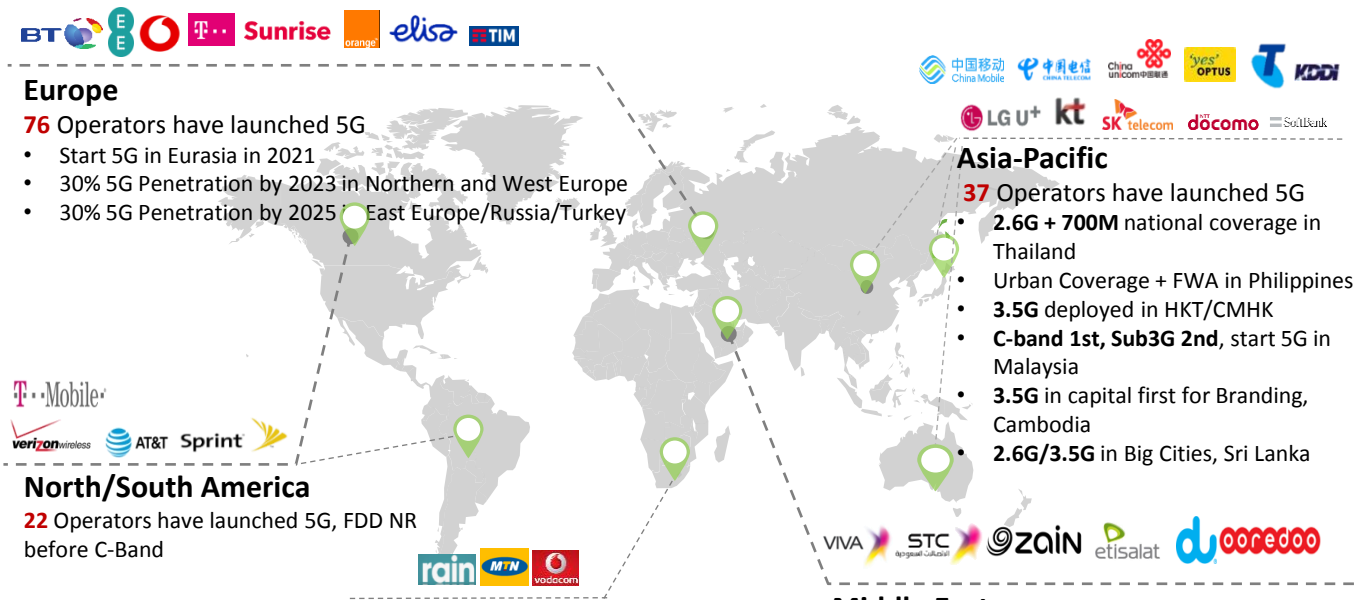
- **184** TD-LTE commercial networks in **86** countries have been launched
- **181** TD-LTE commercial networks in **83** countries are in progress or planned
- **2.48** million TD-LTE base stations (By Q4, 2019)
- **2.94** billion TD-LTE subscribers

Source: GTI, TDIA, GSA, GSMA
As of Q1, 2021

5G Global Commercialization is Accelerating

163 5G Commercial Networks in 68 countries launched

436 Operators in 133 Countries have deployed, tested or trialed 5G



Source: GTI, GSA, as of April, 2021

GTI Breakthroughs and Achievements in 2020-2021 (1/3)

23 Newly Released White Papers and Technical Reports

Network

GTI NSA Commercial Network Deployment White Paper_v2.0
This white paper will serve as a platform to share the results of test and strategies of 5G NSA commercial network deployment, parameters and performance optimization experience, thus providing a reference to industry partners to promote 5G industry maturity and accelerate its scale commercialization and evolution to SA.

GTI 2300MHz Industry White Paper_v1.0
This white paper will provide the advantages of TDD spectrum, information of 2300MHz ecosystem, suggestions for facilitating the efficient utilization and fast deployment of LTE TDD globally and smooth evolution to 5G, as well as policy recommendations for regulators to facilitate high use of spectrum efficiency.

GTI Mobile Broadband Foundation White Paper_v1.0
This white paper stresses that mobile broadband is an infrastructure of national ICT, and its development requires the joint efforts of governments, operators, and related social resources to work hand in hand on networks, users, and digital services.

GTI 5G Intelligent Network White Paper_v1.0
This white paper analyses a serious of practical use cases, intelligent network levels, intelligent network architectures of the representative use cases, and general function requirements on intelligent network elements and intelligent network management.

5G Device

GTI 5G Global Device White Paper_v1.0
This white paper explores the 5G multi-mode multi-band device requirements of wireless network operators and service providers deploying the latest generation of mobile broadband technology, and also highlights certain key 5G technological requirements related to multi-mode mobility and MIMO support required by GTI operators.

GTI 5G S-Module White Paper_v3.0
This white paper mainly focuses on the 5G S-Module and has been carried out in several sections in turn. It analyses the required basic functions, the hardware technical requirements, the electrical interface technical requirements, test & certification and the typical technical solutions for 5G S-Module.

GTI 5G Device RF Component Research Report_v4.0
This report has been carried out in two directions respectively, the sub-6GHz RF components and the millimeter wave RF components. It analyses the industrial status, key technologies, design challenges, alternative process and research progress of core 5G RF components, such as power amplifier, filter, low noise amplifier and switch.

GTI Breakthroughs and Achievements in 2020-2021 (2/3)

GTI 5G Device OTA Test Specification_v2.0
This specification targets enhanced Mobile Broadband (eMBB) scenario for 5G Device products testing, and provides an evaluation criteria for UE OTA performance in the 5G test.

GTI 5G Device Power Consumption White Paper_v4.0
This white paper provides the analysis of the factors of power consumption, such as the key components /the 5G feature and the service type/the test solution and the performance requirements of power consumption for 5G device.

GTI Sub-6GHz 5G Device White Paper_v5.0
This white paper is necessary to facilitate the development of 5G chipset/device and the corresponding test instruments, and targets eMBB scenario for Sub-6GHz 5G commercial products, which is conducted to be the technical references for the development of chipset/ device and the basis for the 5G commercial products specs.

GTI 5G Device Function and Performance Test Specification_v4.0
This specification provides evaluation criteria for basic functions and performance in the 5G test. Considering various test requirements, specific test cases and methods are designed, together with the basic requirements for each test category, number of test devices, and tailored agreements.

NGMN-GTI 5G Smart Devices Supporting Network Slicing White Paper_v1.1
This white paper was jointly released by NGMN and GTI. It introduces challenges faced by the characteristics of network slicing in the design and technical implementation of system, and various reference architectures and technical design schemes for network slicing in devices.

GTI 5G Device Function and Performance Test Specification_v4.1
This specification targets enhanced Mobile Broadband (eMBB) scenario for 5G Sub-6GHz Chipset, Module and Device products testing. It not only stipulates the 5G device function and performance test in lab for NSA Mode (Option 3/3a/3x) and SA (Option 2), but also provides evaluation criteria for basic functions and performance in the 5G test.

5G Enterprise Network Solutions (5G ENS)

GTI Security Consideration for 5G Smart City White Paper
This whitepaper focuses on the potential security threats and challenges brought by the application of 5G technologies to Smart City, and the security capabilities required to address these threats.

GTI Wireless Solution for 5G ENS White Paper
This white paper summarizes differentiated network requirements of industry customers, proposes three types of wireless enterprise network solutions, and analyzes the network architecture, network performance (coverage, performance, reliability, and isolation), application scenarios, and industry conditions.

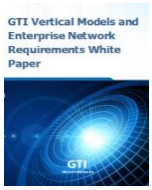
GTI Breakthroughs and Achievements in 2020-2021 (3/3)

GTI 5G Network Architecture and Capability Customization for ENS White Paper

This white paper indicates that as 5G technologies mature, an increasing number of vertical industries are becoming aware of the fact that industry-specific private 5G networks will aid their digitalization and industry upgrade, helping the enterprises meet the needs of a faster and more diverse market.

GTI URLLC Evaluation White Paper (Phase II)

This white paper involves more vertical, such as differential protection in electrical power distribution and motion control in factory automation. And more simulation assumptions are adopted, such as FDD, new frequency band (700MHz), new frame structure, etc.



GTI Vertical Models and Enterprise Network Requirements White Paper

This white paper describes the requirements and application scenarios of 5G networks in major industries, summarizes and analyzes common scenarios and requirements, and provides a set of basic capabilities required for 5G networks to meet industry requirements.

GTI Vertical Spectrum Strategy White Paper

This white paper assesses the overall system level performance for coexistence scenarios where a local vertical industry uses, e.g a URLLC factory network has to fulfill the desired latency and reliability requirements while being interfered by the overlaid operator macro network offering wide area coverage in the same frequency band.

GTI Celluar-IoT Universal Module Specification_v2.0.0

This present document proposes mechanical, electrical, software and performance requirements for Cellular-IoT universal module implementations. The assigned allocations are intended to enable the module supplier and host device integrator to design compatible circuits with aligned pad assignments as specified.

GTI White Paper of Value of 5G High Uplink in Industrial Digitalization

This white paper analyzes the requirements of service processes and connections for 5G as well as 5G's value in the first-batch demonstration industries, including port, steel and mining, based on China Mobile's and Huawei's exploration. Suggestions are also provided on how to improve the uplink bandwidth capabilities of current networks.

GTI Research Report on 5G Industry Access Gateway_v1.0.0

This research report puts forward the concept of industry access gateway, discusses the technical specifications of access gateway used in industry and enterprise, and makes suggestions on the application mode and test content of access gateway in typical application scenarios of smart park, smart factory and smart port.

Research Report on 5G Handheld Device for Vertical Industry_v1.0.0

This research report puts forward the industry-oriented concept of 5G handheld terminals, and discusses the technical specifications and industrial applications of corresponding handheld terminals in public security, industrial and enterprise fields.

※ To get full version of GTI white papers,
- View on the GTI website http://gtigroup.org/Resources/rep/
- Scan the QR code to download GTI APP to view

GTI APP

GTI Organization

Leaders Committee

Provide guidance to GTI

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Kyungpyo Hong CTO / EVP Institute of Convergence Technology KT	**Chung Ng** SVP, Group CTO Office PCCW-HKT	**Mathew Oommen** President Reliance Jio	**Osamu Kamimura** Vice President and Head of Spectrum Policy Office SoftBank	**John Saw** EVP of Advanced and Emerging Technologies T-Mobile US	**Luke Ibbetson** Director of Strategy and R&D organization Vodafone

Partner Forum Leadership Committee

CICT 中国信科 · ERICSSON · greenpacket · HUAWEI · 工業技術研究院 Industrial Technology Research Institute · NOKIA · Qualcomm · qorvo all around you · SAMSUNG · SERCOMM · ZTE

GTI Secretariat

GTI Press Office

Gather partner media resources, and enhance GTI's international influence

GTI Certified

Meet the requirements of the industries, and promote the scale development of the industry

Promote the maturity of technologies and products

Technical Work

——4 Programs

Program 1: 4G & Evolution

No. of Projects: 6

Massive-MIMO
Uplink Enhancement
Smooth Evolution
Roaming
Innovative Business & Service
LTE Plus

No. of tasks: 17

Program 2: 5G eMBB

No. of Projects: 6

Sub-6GHz
Above 6GHz
New Device
Architecture
Test Equipment
Network Intelligence

No. of tasks: 36

Program 3: 5G Enterprise Network Solutions

No. of Projects: 7

Vertical Requirements and Solutions
Spectrum Strategy for Verticals
Products for Verticals
Technical Architecture and Solutions
Operating and Management
Security
Vertical Solutions

No. of tasks: 24

Program 4: Innovative Business & Service

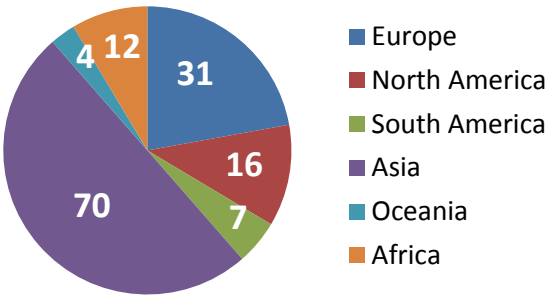
Cloud XR
Global Roaming
Business Model
.....

Detailed information is coming soon

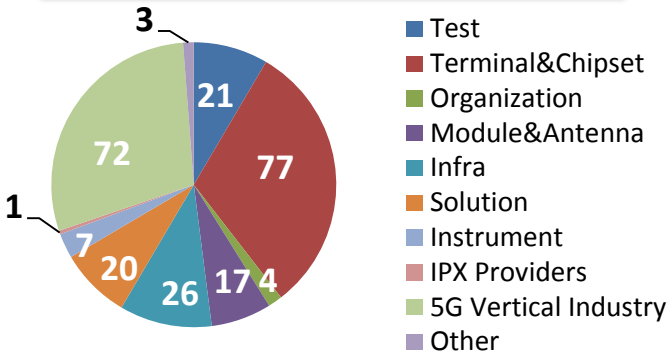
GTI Members Updates and Activities in 2021

140 Operators and 248 Industry Partners Joined GTI by Mid-May 2021

140 Operators



248 Industry Partners



72 Vertical Industry Partners

Including IoT, IoV, Communication Capability, Industrial Internet, Cloud Robot, VR/AR

BAIC	Changhong	China AVIC	EVE Energy	Feitian	BOCO
GAEI	Goertek	Haier	Hisense	IESLab	Ehang
Jinan Towngas	LeAutolink	Neusoft	Oviphone	Canny Robot	Ecaray
Signify	SAFT SA	Shougang Automation Information		iStaging	Skymind
Taiyo Yuden	WapWag	Wireless Car	Xiaomi	Bettershine	SIASUN
iQIYI	Hongyu	Holoview Lab	UISEE	CEPRI	G7 Networks
Pico	HiScene	Cyber Cloud	Shitian	3Glasses	Phansion
IDEALENS	7D Vision	ChipEsthesia	AEE	LIESMARS	KuangChi
AIpark	HUYA	DeepRobotics	JD Logistics	.....	

GTI Activities

2021	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Summit	GTI Summit (at MWC Shanghai 2021) *Time: 23rd February* Venue: Shanghai + Live Streaming		GTI Summit (at MWC Barcelona 2021) *Time: 30th June* *Venue: Online*			
Workshop		The 30th GTI Workshop *Time: 23rd-25th March* *Venue: Online*	The 31st GTI Workshop *TBD*	The 10th Spectrum and Technology Workshop (at ITU Telecom World 2021) *TBD*		The 32nd GTI Workshop *TBD*

Welcome to Join GTI

GTI, *founded in 2011 by Bharti Airtel, China Mobile, Sprint (Clearwire), SoftBank and Vodafone, has been dedicated to constructing a robust ecosystem of TD-LTE and promoting the convergence of LTE TDD and FDD. As 4G evolves to 5G,* ***GTI 2.0*** *was officially launched in 2016, aiming not only to further promote 4G evolution and expand its global market, but also to promote 5G development and cross-industry innovation. After years of joint efforts, GTI has become one of the most influential global cooperation platforms with* ***139*** *operators and* ***248*** *partners.*

How to Join GTI

Join as GTI Operators (with TDD Spectrum)

1. Fill out the Application Form (download from http://gtigroup.org/about/join/2013-11-11/1419.html), and return it to GTI Secretariat: admin@gtigroup.org;

2. Sign the GTI Letter of Intent (LOI) documents and mail the signed hard copies to GTI Secretariat;

3. Once the participation process finishes, a GTI website account and associated password will be assigned to the new participant.

Join as GTI Observers (without TDD Spectrum)

1. Fill out the Application Form (download from http://gtigroup.org/about/join/2013-11-11/1419.html), and return it to GTI Secretariat: admin@gtigroup.org;

2. Sign the Declaration Form and mail the hard copy to GTI;

3. Once the participation process finishes, a GTI website account and associated password will be assigned to the new participant.

Join as GTI Partners (GTI Partner Forum)

1. Fill out the Application Form (download from http://gtigroup.org/about/join/2013-11-11/1422.html), and return it to GTI Secretariat: admin@gtigroup.org; GTI Secretariat and Working Group Chairmen will review;

2. Sign the Declaration Form and return the signed hard copy to GTI Secretariat;

3. Once the participation process finishes, a GTI website account and associated password will be assigned to the new participant.

GTI

CONTACT GTI:

If you have any questions, comments, suggestions regarding 4G, 5G or general enquiries regarding GTI, please contact: admin@gtigroup.org