

# TD-LTE Industry Briefing

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## GTI Successfully Held GTI Summit in Shanghai

**GTI Summit 2015 Shanghai**, was successfully held on 15<sup>th</sup> July, during the Mobile World Congress Shanghai 2015. This summit attracted more than 500 executives globally from the government, leading telecommunication organizations, operators, vendors, service providers, media and consulting companies.



**Executives from the Government, the World's Leading Organizations and Operators Shared the Industry Development Status and Their Strong Support on Further Development of TD-LTE**



**Mr. Shang Bing, Vice Minister, MIIT of China**

*'GTI is a very important global cooperation platform. GTI can play a greater role in the industry development, to promote multi-mode and multi-band, roaming, LTE TDD/FDD converged network and the evolution of TD-LTE.'*

**Mr. Xi Guohua, Chairman, China Mobile**

*'China Mobile will continue to collaborate with industries and jointly promote further development of the mobile broadband technology. I would like to propose that the GTI should become an important platform to promote the development of 5G technology and industry.'*

**Ms. Anne Bouverot, Director General, GSMA**

*'GSMA will continue to support GTI. We have a network 2020 working group with all the leading operators in the world, working on all these evolutions of LTE, we are also starting to prepare for the world of 5G.'*

**China Mobile Released Technology Vision 2020+ and NovoNet Vision**



About 5G Research, Mr. Li Zhengmao, Executive Vice President, China Mobile, said that China Mobile will jointly build a 5G Innovation Center with global operators, telecom companies, internet companies and vertical industry partners, to promote the development of 5G innovative applications and the maturity of 5G industry.

# GTI Successfully Held GTI Summit in Shanghai

Executives from Top-notch Global Operators and Partners Showed Their Progresses and Plans about Converged LTE TDD/FDD Network, Innovative Products and Service, and 5G



**Mr. Seizo ONOE, CTO and EVP, NTT DoCoMo**

*'DOCOMO plans to launch TD-LTE in 3.5GHz in 2016. TDD and FDD are common and converged in LTE. Technology convergence has been the trend for cellular systems, and Full-duplex and Carrier Aggregation will encourage further convergence toward 5G.'*



**Dr. Masashi USAMI, Executive Director and General Manager, R&D Strategy Division, KDDI**

*'We think TD-LTE with higher frequency bands may give us a key solution. KDDI will continue to improve user experience, even in a higher traffic dense area by introducing TDD and FDD joint operation.'*



**Dr. Alex Jinsung Choi, CTO, Head of Corporate R&D Center, SK Telecom**

*'I strongly believe that TD-LTE will continue to grow reply. I hope that Korea in some time will commercialize TD-LTE network as well. SK Telecom expects to start deploy 5G commercial network in 2020.'*



**Mr. Vincent RUMEAU, Connected Car Program Manager, PSA Peugeot Citroen**

*'Vehicle is strongly influenced by technological diffusion of digital information and telecommunications. 5G will speed up the transition from a closed vehicle to an extended vehicle.'*

## Panel

Top leaders from China Mobile, SoftBank, Ericsson, Huawei, Nokia, Qualcomm, ZTE and Alcatel-Lucent shared their views on the evolution of TDD and discussed in-depth the related technologies.



Inspiring speakers from SoftBank, PT Internux, YTL Communications, AZQTEL and ON Telecom discussed the opportunities in the emerging market and shared their status and strategies of TD-LTE development in the market.





## 13<sup>th</sup> GTI Workshop Continued to Draw Attention

The 13th GTI (Global TD-LTE Initiative) Workshop took place during 13-14<sup>th</sup> July, 2015 in Shanghai, China, gathering more than 160 industrial leaders and experts from 27 operators and 44 industrial partners and organizations to share latest progress and discuss key issues about TD-LTE commercialization.



Operators and vendors shared updates and key issues on LTE TDD/FDD convergence, carrier aggregation, VoLTE, RCS, LTE-A, Spectrum for Future, 3.5GHz, Roaming, Business Models and Smart Home. Two panel sessions held for the first time triggered in-depth discussions on LTE-A technologies and business models.



In addition, the workshop suggested exploration on competitive advantages of TDD technologies including multiple-antenna 3D-MIMO, Massive CA, Flexible subframe configurations and etc., aiming at a smoother evolution from 4G to 5G that enlightens the industry.

# Tri-sector Antennas Help Eliminate Antenna Clutter

No one likes a cluttered skyline particularly the authorities who give permission for the erection of mobile towers and antennas. With increased pressure on networks to provide better coverage and increased data rates, the clutter can only increase. Tri-sector antennas offer a solution to the problem, as this photograph clearly shows – conventional three sector masts to the left, with a tri-sector which provide the same functionality to the right.



Tri-sector technology conceals multiple sector antennas inside a low diameter cylindrical housing. The use of a single compact radome to house a full suite of antennas makes it the ideal solution when planning and zoning restrictions limit standard antenna deployments. It is designed to be easily mounted on rooftops, and on street furniture such as flagpoles and lighting fixtures, and is available in a variety of antenna configurations to suits most applications.

Typical features include:

- 3300-3800MHz for TD-LTE (698-960 & 1710-2690 also available)
- 2x2 and 4x4 MIMO
- Low diameter housing
- Fully integrated RET
- Up to 12 ports
- Excellent pattern control in a low profile package
- Suppressed upper sidelobes



# Datang Mobile Carried Out TDD/FDD Load Balancing Trial with China Unicom

Recently in Tianjin Unicom, Datang Mobile carried out TDD/FDD load balancing trial. As the leading vendor of TD-LTE, Datang Mobile conducted specific load balancing algorithm testing which lay the foundation of mobility load balancing optimization for the future TD-LTE and LTE FDD convergence networking issues.

Since FDD LTE commercial license was issued China Unicom has actively deployed converged TDD/FDD network and 4G users have increased rapidly at the same time. However, due to the randomness, time-varying, and uneven distribution of terminal traffic, some areas have low network utilization, and some hot spots with only one FDD carrier can't meet the requirements of large subscriber base and high capacity.

Load balancing function of SON, introduced by LTE R9, could further optimize network and gain good user perception which could deal with local traffic load imbalance between adjacent cells effectively, thereby upgrade capacity and reduce congestion of the entire system. Load balancing among different vendors is mainly used to solve load imbalance problem between same coverage cell carriers in hybrid networking scenario.



The LTE network operated by Tianjin Unicom is dual-mode. The whole network adopts LTE FDD (2\*20M) and the majority of hot spot areas use TD-LTE & LTE FDD. In order to improve system throughput and network capacity without additional hardware system, TDD/FDD convergence is needed. The load balancing is able to switch part users from one LTE mode to the other LTE mode so as to balance dual-carrier utilization rate and promote user perception ultimately.

Datang Mobile takes the lead in the TDD/FDD Load Balancing Trial in Tianjin Unicom. The verification result shows that TDD and FDD are capable of bilateral load balancing after the function is activated. Besides, Datang Mobile uses professional signaling instrument to analyze different-vendor & different-mode features of Tianjin Unicom LTE network and provides valuable experience for building high-quality converged LTE network in the future.

# China Mobile, Huawei and Qualcomm Co-Release LTE TDD Inter-band 3CC CA Verification

China Mobile recently completed the verification of TD-LTE inter-band 3CC Carrier Aggregation (CA) using Huawei's commercial base station and Qualcomm Technologies' commercial terminal based on the Qualcomm® Snapdragon 810 processor with X10 LTE, a product of Qualcomm Technologies, Inc. Qualcomm Technologies, Inc. is a subsidiary of Qualcomm Incorporated. This CA verification combining one 20MHz carrier at 1.9GHz and two 20MHz carriers at 2.6GHz, achieved downlink peak rates of up to 320Mbps.

China Mobile has 1.9GHz and 2.6GHz spectrum available for TD-LTE-A outdoor coverage. Inter-band CA is of unique value for China Mobile since 1.9GHz is more suitable for coverage advantages, while 2.6GHz is better for capacity. To deploy inter-band CA, China Mobile can take full advantage of both 1.9GHz and 2.6GHz spectrums in order to enhance the user's experience and maintain a competitive edge. Considering the fact that most of China Mobile's 4G macro deployment is based on 1.9GHz, adding 2.6GHz carrier to the current network by using inter-band 1.9GHz + 2.6GHz CA can fully utilize existing resources to achieve a smooth evolution for improving network efficiency.

China Mobile is upgrading its current network to LTE-A by using CA. Moreover, China Mobile is also highly concerned about the innovative research and pilots related to CA:

- *In Shenzhen, China Mobile initiated their 2CC CA scale deployment at the end of 2014*
- *Jiangsu Mobile recently completed the uplink 2CC CA field test with Huawei, which indicated an improved uplink speed by up to 180%*
- *Shandong Mobile completed the downlink 4CC CA authentication, with single user downlink peak rate reaching 400Mbps*
- *Shanghai mobile is working on the expansion of 1.9GHz + 2.6GHz, and is planning to deploy inter-band CA in the near future*

This verification of TD-LTE inter-band 3CC CA enriched CA scenarios has taken one step further towards commercialization, and therefore gives China Mobile and additional competitive advantage. From a global perspective, CA is also gaining in popularity. According to the latest GSA report, as of April 2015, 64 operators worldwide in 69 countries have deployed CA, and 116 operators conducted technical test, as well as is focusing on investment. Chipsets and terminals supporting CA are quickly reaching maturity. In addition to playing a significant role in this verification, the Snapdragon 810 process with X10 LTE will also be widely used in upcoming 4G terminals, such as the LeTV smartphone in China, which supports TD-LTE 3CC inter-band CA.

Additionally, most of the latest smartphones, such as Huawei's Mate7, Honor 6, and Honor 6 Plus and many other brands' smartphones can support 2CC DL CA. As the ecosystem matures, so too will the comprehensive commercialization of CA in the coming future.



## Smartfren is Nokia's 1st Small Cell Reference for TD-LTE 2300MHz

Close on the heels of winning Smartfren as a new TD-LTE & LTE FDD customer in Indonesia, Nokia has closed a deal with the operator for its new Flexi Zone Indoor Pico eNB in the TD-LTE 2300MHz spectrum.



The operator was looking for a small and easy-to-deploy solution to cover hotspots and key indoor locations for offering LTE services to its subscribers. The solution needed to support features such as built in WiFi, general macro feature parity, Carrier Aggregation etc. Initially, Nokia was not invited for the tender but the operator soon realized that compared to others, Nokia small cell solution was the only one that matched its list of stringent requirements and subsequently selected Nokia's Flexi Zone Indoor Pico eNB for the roll out. The rollout is underway and covers 11 key cities in Indonesia including Jakarta to support the operator's LTE launch in June 2015.

"Our first commercial Pico deployment in the TD-LTE 2300MHz spectrum in the world will provide a great reference for other customers globally, opening the door for future deployment within Smartfren and kick starting the LTE Small Cells market in Indonesia in general, " said Ripudaman Lamba, CT Head, Smartfren.

## 3 Hong Kong and Huawei Usher in a New Era of TDD/FDD LTE-A Network in Hong Kong

Creating an outstanding integrated mobile communications experience with LTE-A, enabled by advanced carrier aggregation technology and the new services made available

3 Hong Kong, the mobile communications division of Hutchison Telecom Hong Kong Holdings, and Huawei announced the successful demonstration of an end-to-end TDD/FDD LTE-A commercial network in Hong Kong using carrier aggregation (CA) technology and terminals chip-powered (Snapdragon™ X12 LTE) by Qualcomm Technologies, Inc.

The two companies also demonstrated applications of the new-generation TDD and FDD combined network in different markets, ushering in a new era of TDD/FDD LTE-A network in Hong Kong.



In the TDD/FDD integrated network demonstration, 3 Hong Kong used Huawei One LTE Solution to aggregate an FDD carrier (specifically, paired spectrum in either the 1800 MHz or 2600 MHz band) with TDD 2300 MHz spectrum via CA technology, creating an LTE-A network with two component carriers (2CC).

It is the first time a mobile operator, a telecoms solutions provider and a chipset manufacturer have collaborated on an end-to-end TDD/FDD LTE-A commercial network in Hong Kong. They have also created the world's first TDD/FDD CA commercial network on IP radio access network (RAN) architecture.

The technological breakthrough shows that 3 Hong Kong can support TDD and FDD standards within intra-band or inter-band carriers across different spectrums. The converged network will increase network speed and provide remarkable telecoms services for 3 Hong Kong users. The initiative is in line with 3 Hong Kong's 'Better at 3' philosophy of continuous improvement.

# Spectrum Planning Workshop for 5G in China Held in Xiamen

**'China Workshop on Spectrum Planning for 5G' in conjunction with '3.5GHz product and field trial exhibition for TD-LTE/TD-LTE-Advanced' was held in Xiamen, China**

This workshop was jointly organized by China Academy of Information and Communications Technology (CAICT) and China Mobile. It gathers a broad range of stakeholders including regulators/national administrations, telecom operators, network equipment vendors and chipset manufacturers, as well as TDD Industry Alliance (TDIA) of China.

ITU has now finalized the overall goals, process and timeline for the development of 5G mobile systems. As the lifeblood of wireless network, spectrum planning will significantly affect the pace and technical direction of 5G development. Experts from CAICT, China Telecom, China Mobile, China Unicom, Huawei, Ericsson, ZTE, Datang Mobile, Nokia and Qualcomm shared their early perspectives on spectrum requirement of 5G, considerations of candidate spectrum on high and low frequency band, as well as spectrum planning strategies for 5G in China.

3.5GHz band, with its abundant bandwidth, has been regarded as the next gold band for TD-LTE. This band not only offers a great opportunity for the global development of TD-LTE, but also builds a crucial spectrum anchor for 5G development around the world. The whole industry is looking forward to China's 3.5GHz spectrum planning with great eagerness.

China Mobile and Huawei successfully set up live 3.5GHz TD-LTE-Advanced demonstrations at the Xiamen Software Park Phase II. As the first demonstration, downlink throughput of the world first 3.5GHz CA-capable commercial terminal B2328-42 was showcased on a moving minibus.

Following this, the two companies demonstrated a live 1.2Gbps peak rate by using advanced technologies such as five-carrier carrier aggregation, high-order 256QAM modulation, and 4x4 MIMO. These technologies further maximize the frequency spectrum value of 3.5GHz band, opening up a new era of commercial LTE-Advanced networks using the 3.5GHz band.



*China Mobile and Huawei demonstrated 1.2Gbps peak rate using 3.5GHz band*

# ZTE Signs Joint Pre5G R&D MOU with SoftBank

## MOU to cover cooperation on R&D, evaluation and verification of pre5G technology

10<sup>th</sup> July 2015, Tokyo – ZTE announced the company signed a memorandum of understanding with SoftBank Corp. to collaborate on research and development on Pre5G mobile communications networks technology.

Under the MOU, the two companies will cooperate on R&D, evaluation and verification of mobile communications solutions based on ZTE's Pre5G technology, including Massive MIMO (multiple input multiple output). The agreement builds on existing cooperation between SoftBank and ZTE on technologies including Massive MIMO, UDN (ultra-dense networks) and MUSA (multi-user shared access).

ZTE's Massive MIMO base station has the capability to support more than 100 antenna elements, and provides higher space division multiplexing gains than traditional 8-antenna base stations without changing existing terminals or air interfaces, greatly enhancing spectrum utilization. With ZTE's Massive MIMO base station, up to twelve users can transfer data simultaneously sharing the same radio resource.



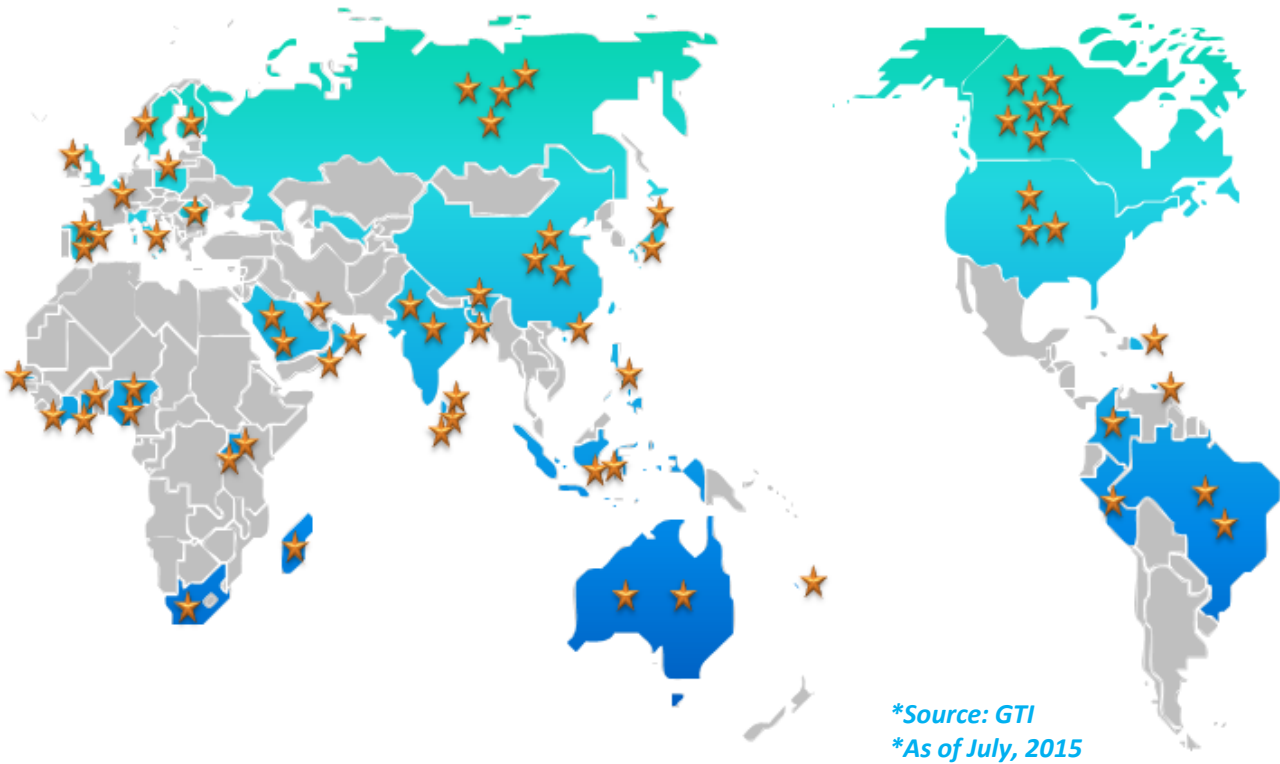
Japan has always been at the forefront of the world in the field of communications technologies. In the 5G field, Japan is expected to be the industry leader of 5G networks, paving the way for making its 5G technology a global standard. Massive MIMO technology provides higher, farther, and deeper coverage than traditional LTE technologies while significantly lowering base station energy consumption, to achieve the ultimate goal of green communications. These advantages can greatly improve the performance of existing AXGP networks. In the practical prototype demonstration, the Pre5G Massive MIMO base station achieved an outstanding result in multi-user 3D coverage far beyond expectations.

# TD-LTE Global Market Overview

## Global Deployment as the Mainstream Mobile Broadband Technology

**63** TD-LTE commercial networks have been launched

Additionally, over **91** TD-LTE commercial networks are in progress or planned



## LTE Multi-mode Multi-band Terminals Have Reached Full Maturity

**320+ suppliers have launched 2055+ TD-LTE terminals, including 1447+ TD-LTE Smartphones.**

TD-LTE Device Type	Quantity	TD-LTE Device Type	Quantity
USB modems	101	Smartphones	1447+
MiFi/CPE	391	Mobile Tablets	47

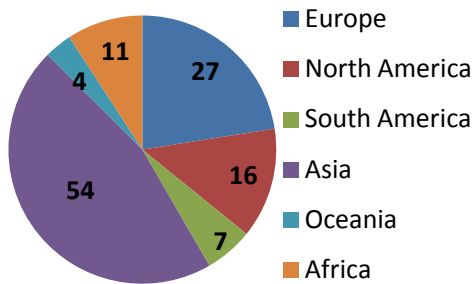
*\*Source: GTI, GSA, TDIA*



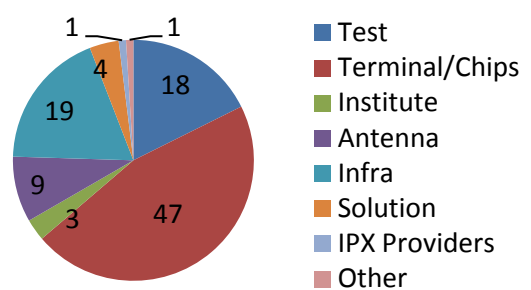
# GTI Development Overview

**120 Operators and 102 Partners Joined GTI by August 2015**

**120 Operators**

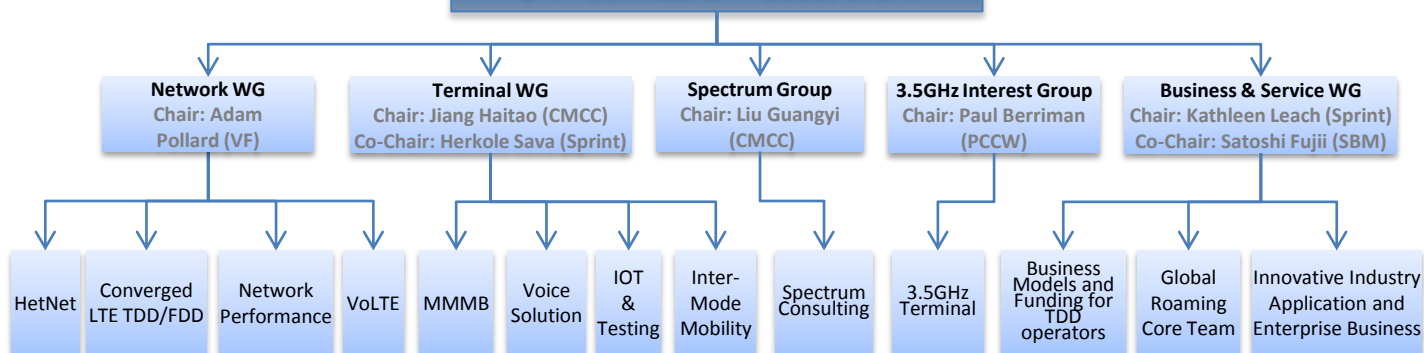


**102 Industry Partners**



**GTI Established 4 Working Groups, 1 Interest Group  
Covering 12 Task Forces and 1 Core Team**

## GTI Technical & Product Work



## GTI Activities

	2015	Feb/Mar	Apr/May	Jun/Jul	Oct/Nov
Summit (2)		3 Mar (MWC) Barcelona, Spain GTI Summit		15 Jul (MWC) Shanghai, China GTI Summit-Shanghai	
Workshop (4)		26-27 Feb Barcelona, Spain The 12 <sup>th</sup> GTI Workshop		13-14 Jul (MWC) Shanghai, China The 13 <sup>th</sup> GTI Workshop	12-13 Oct (ITU Telecom World) Budapest, Hungary The 14 <sup>th</sup> GTI Workshop 15 <sup>th</sup> TD-LTE Technology & Spectrum Workshop
Exhibition (3)		2-5 Mar (MWC) Barcelona, Spain		15-17 Jul (MWC) Shanghai, China	12-15 Oct (ITU Telecom World) Budapest, Hungary

# Appendix 1 – Welcome to Join GTI (to operators)

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## More Information about GTI

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*To find out more information about GTI, please visit [www.lte-tdd.org](http://www.lte-tdd.org) or email us.*

## How to Join GTI

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### GTI Operators (with TDD Spectrum)

1. Fill out the application form (download from <http://www.lte-tdd.org/joinUs.html> ), and return to GTI Secretariat: [GTI\\_Secretariat\\_list@lte-tdd.org](mailto:GTI_Secretariat_list@lte-tdd.org) and/or [GTI@lte-tdd.org](mailto:GTI@lte-tdd.org);
2. Sign the Accession Form and return the signed copy to 5 initiators;
3. Once the participation process finishes, a GTI website account and associated password will be assigned to the new participant.

### GTI Observers (without TDD Spectrum)

1. Fill out the application form (download from <http://www.lte-tdd.org/joinUs.html> ), and return to GTI Secretariat: [GTI\\_Secretariat\\_list@lte-tdd.org](mailto:GTI_Secretariat_list@lte-tdd.org) and/or [GTI@lte-tdd.org](mailto:GTI@lte-tdd.org);
2. Sign the declaration form and return the 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.

## Appendix 2 – Welcome to Join GTI Partner Forum (to non-operators)

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### More Information about GTI Partner Forum

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*To find out more information about GTI and GTI Partner Forum,  
please visit [www.lte-tdd.org](http://www.lte-tdd.org) or email us.*

### How to Join GTI Partner Forum

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1. Fill out the application form (download from <http://www.lte-tdd.org/joinUs.html> ), and return to GTI Secretariat:  
[GTI\\_Secretariat\\_list@lte-tdd.org](mailto:GTI_Secretariat_list@lte-tdd.org) and/or [GTI@lte-tdd.org](mailto:GTI@lte-tdd.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.

CONTACT GTI:

If you have any questions, comments, suggestions regarding TD-LTE or general enquiries regarding GTI, please contact:

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