

# 5G+X

## Beyond Connectivity



[WWW.GTIGROUP.ORG](http://WWW.GTIGROUP.ORG)



GTI APP





## Objective

- Construct a robust ecosystem of TD-LTE
- Speed up the commercialization of TD-LTE
- Promote the converged development of LTE TDD and FDD



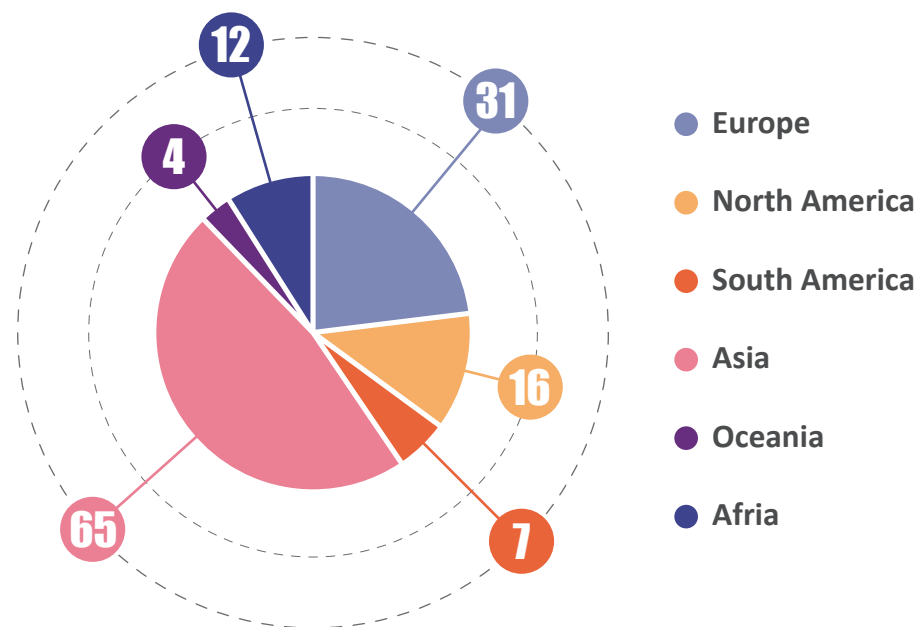
## Objective

- Further promote 4G evolution and expand global market
- Promote 5G development and cross-industry innovation

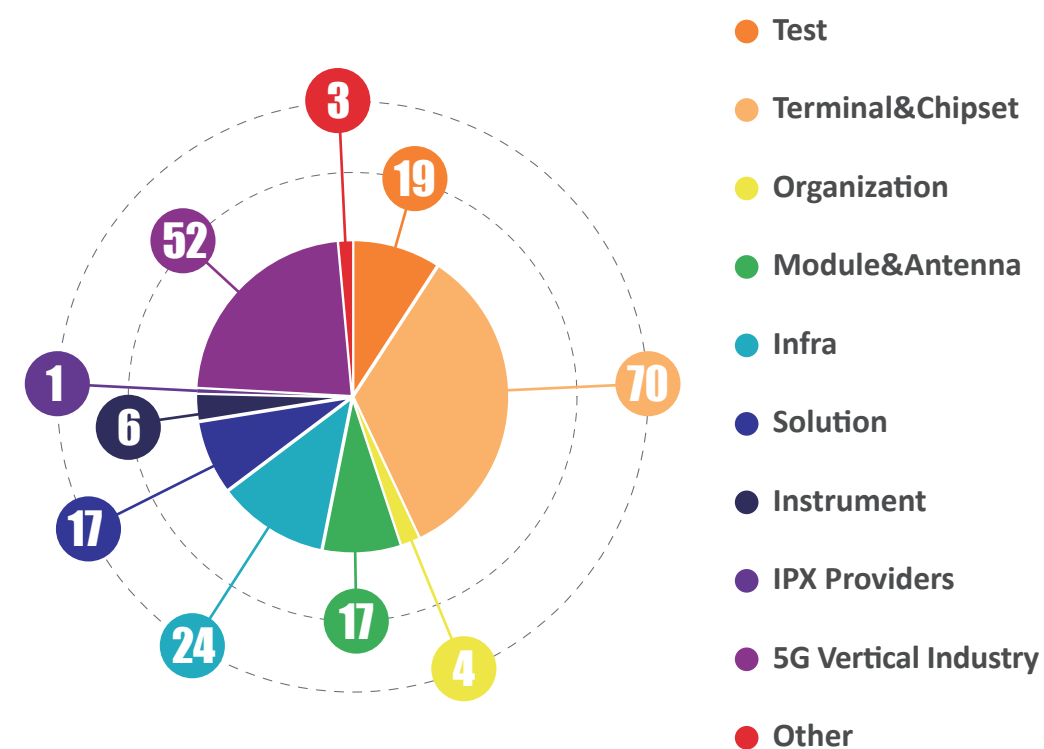


## GTI Has Become One of The Most Important Platforms for Industrial Collaboration

135 operators have joined GTI

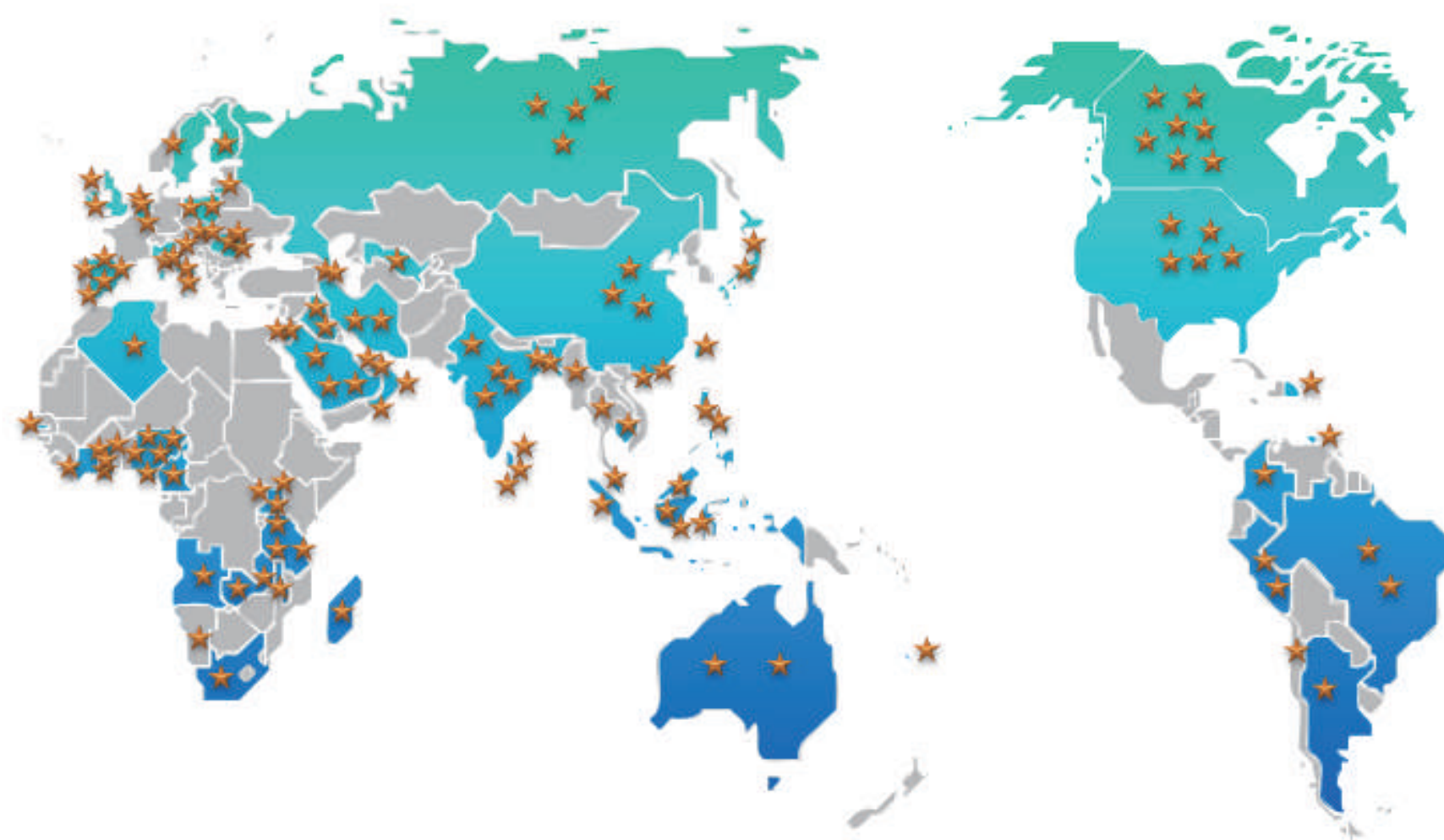


213 vendors have joined GTI Partner Forum



By May, 2019

## Successful Global Commercialization of TD-LTE



**167** TD-LTE commercial networks in **80** countries, and  
**158** TD-LTE commercial networks in **80** countries in progress

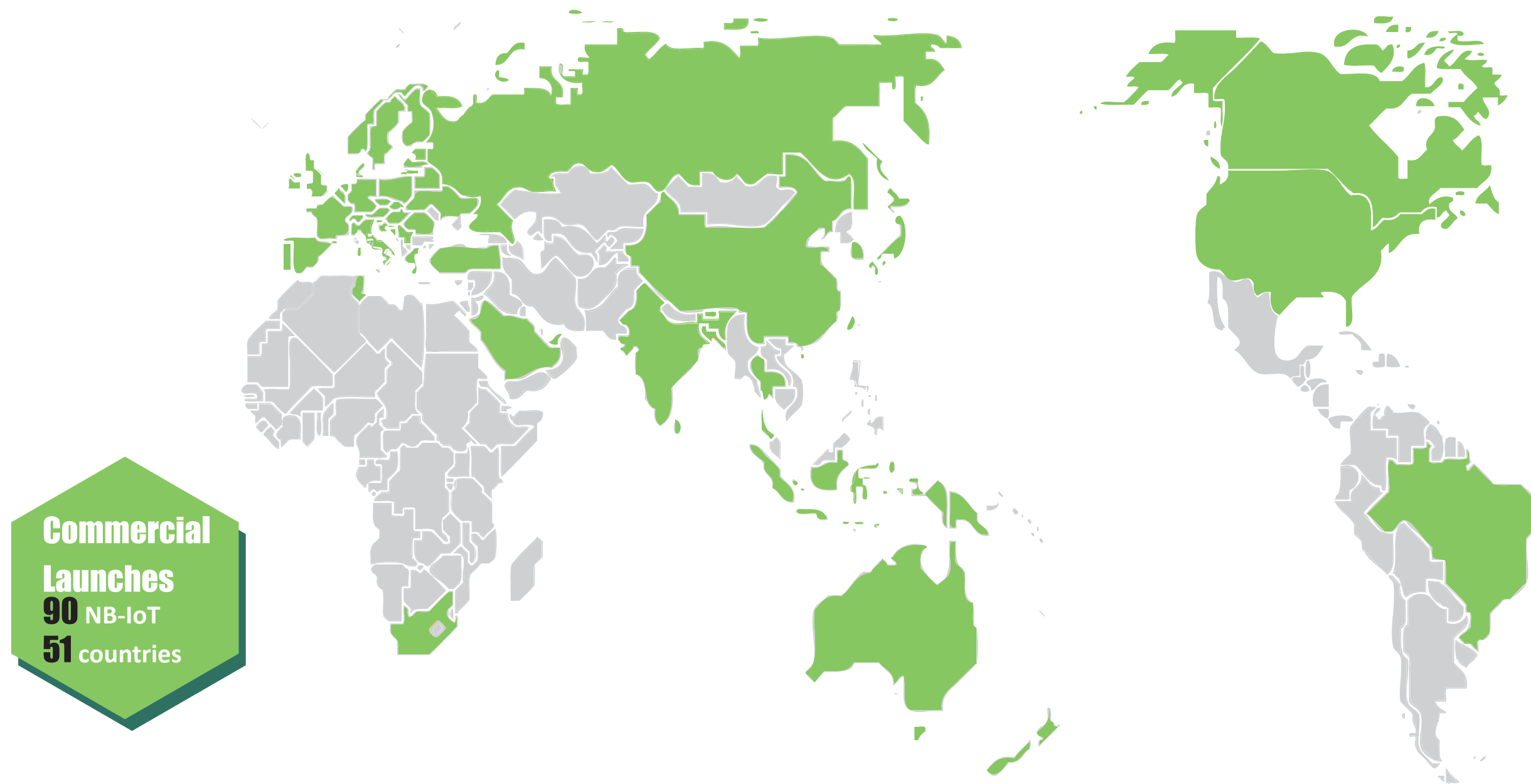
**3.63 million** TD-LTE base stations

**2.3 billion** TD-LTE subscribers

**10,287** TD-LTE terminals, **73%** supporting TDD/FDD

Source: GTI, GSA, GSMA, TDIA  
 By May, 2019

## Maturing M-IoT Industry Facilitates M-IoT Commercial Launches on a Global Scale

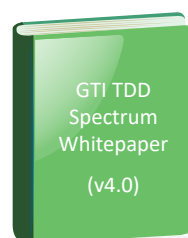


Source: GTI, GSA  
By May, 2019

## Breakthroughs and Accomplishments

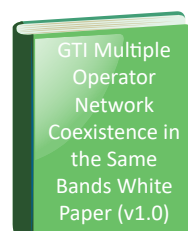
7 new whitepapers and technical reports will be released during MWC Shanghai 2019 accelerating 5G and M-IoT commercialization, guiding the industry development

### 5G Network



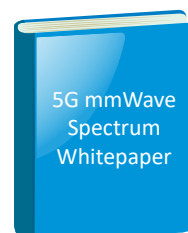
#### GTI TDD Spectrum Whitepaper (v4.0)

This whitepaper summarizes the advantage of TDD spectrum, the driving force of TDD network rapid deployment, the acceleration of 5G-Oriented TDD spectrum allocation and some recommendations and suggestions for operators/standardization organizations/regulators.



#### GTI Multiple Operator Network Coexistence in the Same Bands White Paper (v1.0)

This whitepaper introduces the issues of multiple operators coexistence in the same 5G frequency bands and targets to study the coexistence conditions and requirements for multiple operators in adjacent TDD 5G bands without interference to each other.



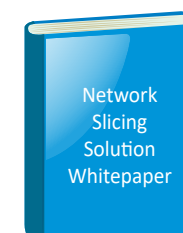
#### 5G mmWave Spectrum Whitepaper

This whitepaper updates the global situation regarding the 5G mmWave spectrum, promotes a GTI view on proper technical requirement for coexistence with the existing services. We conclude a GTI proposal of the future 5G mmWave spectrum strategy for developing the products and deliver our view towards WRC-19 AI 1.13.



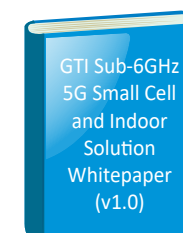
#### 5G MEC Deployment Strategy Whitepaper

This whitepaper will serve as a platform to share the latest MEC industry progress, initiate 5G MEC deployment strategy discussions and provide key solutions, finally introduce the current use cases and trails that will be continuously updated.



#### Network Slicing Solution Whitepaper

This whitepaper describes network slicing conceptual architecture. Focus on end-to-end network slice and provide the related key technologies and deployment strategy. Finally share foresight technologies, the trends and use cases of network slicing.



#### GTI Sub-6GHz 5G Small Cell and Indoor Solution Whitepaper (v1.0)

This whitepaper describes some typical indoor scenarios in 5G era. According to these scenarios characteristics, requirements and challenges are abstracted and corresponding solutions with necessary key technologies are also provided. Finally provide some indoor deployment options to industry for reference.



#### 5G E2E Test Instrument Map Whitepaper

This whitepaper summarizes the typical application, stages and test scenarios for Devices, Base station and Core network, regarding these test requirement, and shows corresponding test instrument, solution to the 5G industry.



New release during MWC Shanghai 2019

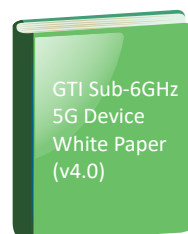


Released during MWC Barcelona 2019

## Breakthroughs and Accomplishments

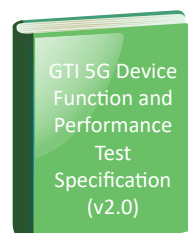
### Whitepapers and Technical Reports

#### 5G Device



#### GTI Sub-6GHz 5G Device WhitePaper (v4.0)

The whitepaper defines technical requirements and focuses on the discussion about key research points of 5G Device. Version 4.0 adds the discussions on more 5G key technology, including 4G-5G Spectrum Sharing, NSA/SA Mode Switching, Dynamic Power Sharing, USIM application and UE Function and Performance Enhancement in Rel-16.



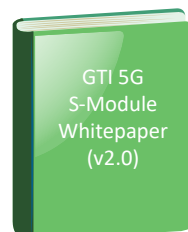
#### GTI 5G Device Function and Performance Test Specification (v2.0)

Release 44 new test cases in Phase 2 spec . The total number of completed test cases has reached 110  
Introduce test cases for new features including Voice call, power consumption tests with DRX/BWP, mobility tests under Multi-mode cells...



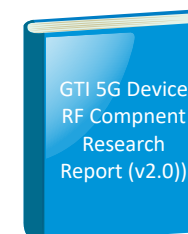
#### GTI 5G Device Power Consumption Whitepaper (v2.0)

This whitepaper focuses on the analysis of key components of power consumption/ Factors of power consumption analysis- 5G features/Requirement of 5G terminal power consumption and Test method and instruments. This version we update Parameter configuration recommendation.



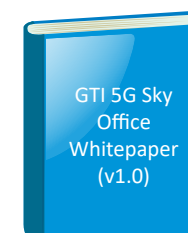
#### GTI 5G S-Module Whitepaper (v2.0)

Based on "GTI 5G S-Module Whitepaper (v1.1)", which already includes "Basic Type" and "Smart Type", "All-in-one Type" has been newly introduced in Chapter 8 as well as the typical application scenarios for all the three types of GTI 5G S-Modules in Chapter 11.



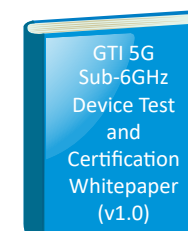
#### GTI 5G Device RF Component Research Report (v2.0)

The report is expected to help people to develop 5G devices and to promote industrial development. It may also help people to know more about the industrial status of 5G device RF components. Meanwhile, it may also help readers interested in 5G device RF components to gain from the further thinking.



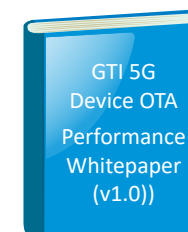
#### GTI 5G Sky Office Whitepaper (v1.0)

This whitepaper provides an overview of 5G market status, focusing on laptop market and office software support. According to the observation of potential market demand, the concept and objective of sky office are given.



#### GTI 5G Sub-6GHz Device Test and Certification Whitepaper (v1.0)

The whitepaper is expected to give an introduction on the test methodology and certification scheme for 5G chipset, module and device products.



#### GTI 5G Device OTA Performance Whitepaper (v1.0)

This white paper provides a technical overview of the 5G device OTA performance. As we all know, OTA is the key method to evaluate the antenna performance and the OTA performance of wireless devices and reflect its access and throughput performance in real network.



## Breakthroughs and Accomplishments

### Whitepapers and Technical Reports

#### M-IoT



#### GTI Best Practice for FOTA of NB-IoT Device Whitepaper

The whitepaper analyzes the FOTA requirements of NB-IoT devices, the challenges and chances for FOTA based on the NB-IoT network, and proposes an end-to-end FOTA solution and reference implementation of NB-IoT devices based on LwM2M, including the architecture and implementation of incremental image generation, firmware image download process, breakpoint continuation, state machine.



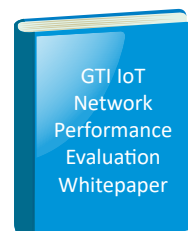
#### GTI Security Test Guide for IoT Device and Certified Devices

The purpose of this document is to enable the suppliers of IoT products, services and components to assess the conformance of their products, services and components to the GTI Security test Guide for IoT device. Completing a GTI Security Assessment will allow an entity to demonstrate the security measures they have taken to protect their products.



#### GTI IoT Device Solution Whitepaper

To accommodate the rapid development of M-IoT technologies (NB-IoT/eMTC) and give the guidance of M-IoT device development, this whitepaper will present the overview of M-IoT device solutions, which include cost-effective RFFE solution, M-IoT Chipset Requirements and Architecture, Optimized device solution on low power, eSIM based implementation solution, etc.



#### GTI IoT Network Performance Evaluation Whitepaper

In order to evaluate the condition of the NB-IoT network, the whitepaper describes a Network Performance Model. NB-IoT KQI includes RSRP Distribution Percentage, SINR Distribution Percentage, Attach Success Rate, etc. NB-IoT network KQI for Application includes Power consuming, Service Delay, Simultaneous Capacity, etc.

※ To get the full version of GTI WhitePapers,

View on the GTI website <http://gtigroup.org/Resources/rep/>

Scan the QR code on the cover to download GTI APP to view



## 33 GTI Device Certification Achievements On M-IoT and Applications & Service

### 4 Test Specifications

GTI NB-IoT Module Test Specification  
GTI NB-IoT Interoperability Test Specification  
GTI Test Solution for MIIoT Terminal -Smart Smoke Detector V1.0.0  
GTI 5G Device Function and Performance Test Specification (v2.0)

### 4 Certified Test Labs



### 25 Certified Products Chipsets, modules and device

↓ <http://www.gtigroup.org/e/action/ListInfo/?classid=610>



# GTI 2.0 Technical Work: A Significant Shift to Foster Joint Innovation towards 5G

## Programs with Concrete Deliverables to Continuously Promote 4G Evolution and 5G Development



### DELIVERABLES



Requirement  
Whitepaper



Test/Technical/Business  
& Service Report



Prototype/  
Product



Trial/  
Showcase

...

## GTI Work Plan in 2019

### 01 4G & Evolution

- **4G network capacity and UL performance enhancement:** Massive MIMO/-Multi-beam Antenna and UDC solutions.
- **4G Smooth Evolution:** Address challenges on 4G and 5G working together and provide solutions. Updating the Spectrum and coexistence White Paper; study on 4G/5G Spectrum Sharing and 4G E2E Solution.
- **LTE Plus:** Study on user/Service Experience Differentiation and 4G Final Target Network.

### 02 5G eMBB

- **Sub 6GHz 5G commercial :** promote 3.5GHz and 2.6GHz to become the main band of 5G, provide solutions to product requirements, deployment, performance enhancement and etc.
- **5G device commercialization:** 5G consumer device innovation, S-module application and 5G-enabled industry device exploration and Multi mode Multi band 5G device.
- **Kick off mmWave study** in the second half year.
- **5G network intelligence level:** study on method for evaluating 5G network intelligence level including methodology and use cases; Impact of network intelligence: Define the impacts of network intelligence on network architecture, network elements, network management system and terminals.

### 03 5G Enterprise Network Solutions

- **New Technology:** Technology selection based on vertical scenarios and progressive new technology introduction for verticals.
- **Enterprise Network Solution Based on Licensed Spectrum:** Deliver innovative solutions for vertical area coverage and operational requirement using operator's licensed spectrum.
- **Device:** Standardized 5G module promotion. Device solution for new technology deployment in Greenfield and Brownfield verticals.
- **Application and Service:** Investigating business opportunities in verticals covering both narrow-band and broad-band opportunities.

### 04 Innovative Service & Application

- **Innovative applications:** Strengthen cross-industry cooperation for innovative applications based on 5G+.
- **Monetization:** Explore business models of 5G+ technology and 5G enterprise network.
- **Roaming:** Study on 5G roaming business solutions.

## Global Collaboration, Bright Future!





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