



BRICS
2022 CHINA

2022 BRICS Skills Competition

(BRICS Future Skills Challenge)



TECHNICAL DESCRIPTION

**5G Network Construction and
Operation & Maintenance (Offline)**

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1. Synoptic

1.1 Name and description of skill competition

1.1.1 Name of skill competition

2022 BRICS Skills Competition 5G Network Construction and Operation & Maintenance

1.1.2 Description of skill competition

5G network construction and Operation & Maintenance skill application competition for offline final is organized based on the following three tasks:

Task 1: theoretical part assessment; It mainly assesses 5G base station construction and maintenance technology, 5G network optimization technology, and problem-solving, innovation and creativity in 5G network construction and optimization.

Task 2: 5G network construction and maintenance of virtual simulation system practice; Including task description, network planning, engineering survey, equipment installation, equipment maintenance, and business verification;

Task 3: 5G network optimization virtual simulation training system practice; Including network planning, data collection, network testing, end-to-end optimization, and network wide performance improvement.

The online competition of this event is team competition (2 people).

The practical tasks of this competition include: Practical tasks of 5G base station construction and maintenance virtual simulation training system (As task 2) and Practical tasks of 5G network optimization virtual simulation training system (As task 3). The following two platforms are used respectively: 5G base station construction and maintenance virtual simulation training system and 5G network optimization virtual simulation training system. Based on the b/s framework, the platform realizes the iteration of business modules and supports the expansion of subsequent platform applications.

Practical tasks of 5G base station construction and maintenance virtual simulation training system (Task 2) is composed of six relatively independent and connected modules: the module is divided into five modules: network planning, engineering survey and measurement, equipment installation, business configuration and business verification, which can be flexibly combined according to the actual competition requirements.

1. Capacity planning

The capacity configuration is based on the total number of CPE users, KPN market share, KPN CPE users and other detailed demand parameters of a 5G application scenario, combined with the current capacity estimation formula of 5G outfield, calculate and evaluate the frequency, downlink capacity of each sector, number of sectors and number of stations, and click save after filling in the blank.

2. Engineering survey

Engineering survey

The practical training module of engineering quantity requires that the assessment objects conduct the survey of 5G base station according to the SOP standard process of site survey. To examine the commonly used survey tools and their usage.

Topology configuration

Topology configuration training module: the system provides a graphical (like VISIO) network topology configuration function to componentize 5G related network elements (such as 5G core network, 5G BBU, 5G AAU, OMC, etc.). Whether the assessment object is familiar with the basic architecture of 5G network, the position and role of various 5G network elements in the network structure, and whether the 5G network architecture diagram can be drawn independently.

3. Equipment Installation

The equipment installation training module simulates three working scenarios of warehouse, tower and machine room, including equipment unpacking, equipment inventory and installation tool selection, simulates real equipment, and provides training functions for equipment selection, indoor BBU single board installation, outdoor AAU installation, power supply installation, cable link, label setting, GPS installation and other equipment hardware equipment installation and configuration.

Preparations before Installation

Tools should be well-prepared before installation. The system would automatically list the safety protection equipment and tools related to the engineering construction. Students are to choose tools that are needed and then enter the construction site to complete the equipment installation according to the engineering construction specification. Competitors will be tested about how well they master the engineering construction safety regulations. The warehouse, computer room, and iron tower configuration can only be unlocked when the preparations before installation are finished.

Unpacking Inspection

Assessment in specifications and precautions on unpacking inspection through real simulation of equipment transportation, package damage and distortion during unpacking process. The selection of returns for damaged and distorted packaging and other workflows.

Outdoor AAU Equipment Installation

AAU equipment installation refers to the installation of AAU equipment to the correct location of outdoor base station tower. Students are able to install AAU equipment on the base station tower by dropping and dragging. Then they can use the mouse to select the cable in the cable resource tool to drag the cable to the corresponding interface position of the device and simulate the installation of AAU power supply, optical fiber, and ground fiber and cable in a real working scene.

Indoor BBU Equipment Installation

Indoor BBU equipment dark transfer refers to the correct installation of the BBU frame, BBU boards, DC power supply, network management configuration and other modules in the cabinet of the equipment room. Complete the work of powering on the equipment and connect cables. Assess the professional skills of 5G base station construction-related work, the specific workflow and engineering installation regulations for 5G base station construction and the mastery of the basic working skills of 5G base station construction personnel.

4. Equipment Maintenance

The equipment maintenance training module adopts a 1:1 method to present the network management software interface, and provides all(nearly 100 items) data configuration functions for core network equipment and wireless equipment, as well as training functions that completely simulates real network management software.

The data configuration of various network elements on both the 5G core network and wireless sides can be completed according to the data of the network planning.

5. Business Validation

The service verification module provides 3D animations to show the verification results of 5G services in three different scenarios, which includes 4K HD download, unmanned driving and smart grid. Based on the 3D dynamic interface, you can experience the results of service configuration and the phenomena that are caused by incorrect service configuration.

Practical tasks of 5G network optimization virtual simulation training system (Task 3) This task is divided into five modules: network planning, data collection, network testing, end-to-end optimization, and network wide performance optimization, which can be flexibly

combined according to the actual competition requirements.

1. Network Planning

(1) Wireless network planning based on link budget: Calculate the maximum tolerated path loss according to the edge rate requirements, equipment receiving sensitivity, antenna gain and other data to obtain the maximum coverage of the cell, and then calculate the wire area coverage of the park according to the cell coverage radius and coverage are the number of base stations required.

(2) Capacity-based network wireless network planning: Calculate the data demand of each user during busy hours according to the business model, calculate the number of effective users of the operator according to the number of users in the park and the penetration rate, and further calculate the total demand for data services in the area. The amount of data that can be carried during busy hours, the amount of data that the base station can carry, and finally calculate the number of base stations based on the capacity of the area.

2. Data collection

Collect the planned site information according to the number of base stations planned by the wireless network above

(1) To complete 5G indoor environment information collection, it is necessary to complete the preparation before information collection, indoor wireless main equipment information collection, indoor supporting implementation information collection, and base station installation mode information collection;

(2) To complete 5G outdoor environment information collection, it is necessary to complete the preparation before information collection, station location information collection, sky information collection, information collection tool selection, and community information collection.

3. Network test

Install software and conduct index test.

(1) Test preparation

Simulate the installation of test software and drivers of test equipment;

Connect the test equipment correctly;

Configure test tasks according to test configuration requirements and test scenarios.

(2) Test data analysis and index statistics

After completing the test, it can correctly count the upload and download rates, coverage, connection rate and offline indicators, and can count abnormal events.

4. End to end optimization

(1) Problem discovery

According to the test data and network management indicators, the problems of coverage, switching, speed, dropping, capacity and so on in the network are found;

(2) End to end scenario analysis and optimization

Find out the cause of the problem and deal with it through parameter verification and alarm analysis;

5. Network wide performance analysis

(1) Problem discovery

According to the test data and network management indicators, the problems of coverage, switching, speed, dropping, capacity and so on in the network are found;

(2) Network wide performance analysis and optimization

It can find out the main factors leading to the performance problems of the whole network, the main problem sites, and deal with them through parameter adjustment, alarm processing, etc.

1.2 Relevance and significance of this document

This document contains the standards required for this skill competition, as well as information on the evaluation principles, methods and procedures of the management competition.

Every expert and contestant must understand and understand this technical description. In case of any conflict between the technical descriptions in different languages, the English version shall prevail.

2.Skill standards

2.1 General description of skill standards

Skill standards define knowledge, understanding and specific skills, which are international best practices in technical and professional performance. It will reflect the global consensus on what relevant job roles or occupations represent in industry and enterprises.

The skill competition aims to reflect the international best practices described in the skill standard and the extent to which it can achieve. Therefore, this standard is a guide for the training and preparation required for skill competitions.

The standard is divided into different parts with titles and reference numbers.

Each part is assigned a percentage of the total score to indicate its relative importance in the standard. This is often referred to as "weight". The total score of all percentages is 100. The weight determines the distribution of scores in the scoring standard.

Through the test items, the scoring scheme only evaluates the skills listed in the standard. They will reflect the standards as comprehensively as possible under the constraints of skill competition.

The scoring scheme will be carried out according to the score assigned in the standard within the actual range. A 5% change is allowed, but the weight assigned by the standard specification shall not be changed.

2.2 Skill description

Parts		Importance(%)
1	5G Base Station Construction and Maintenance Technology (Theory)	5
	Participants must know and understand:	
	◆ Recognition of 5G technology characteristics and network architecture;	
	5G NR key technologies	
	Participants must be able to:	
	◆ 5G base station equipment installation	
	◆ 5G base station equipment testing	
	◆ 5G base station business opening and equipment acceptance	
	◆ 5G base station maintenance	
	◆ 5G base station troubleshooting	
Parts		Importance(%)
2	Network Optimization Technology (Theory)	5
	Participants must know and understand:	
	◆ 5G principle and key technology;	
	◆ 5G physical layer analysis;	
	◆ 5G network optimization process;	
	◆ 5G network planning method.	
	Participants must be able to:	
	◆ Complete regional capacity planning and coverage planning through 5G station propagation model and actual wireless environment;	
	◆ Indoor and external environment information collection;	
	◆ Complaint information collection;	
	◆ 5G DT/CQT test preparation and execution;	
	◆ 5G network testing problem handling;	
	◆ 5G network test data analysis;	

	◆ 5G network operation monitoring;	
	◆ 5G network parameters check;	
	◆ 5G network parameter setting;	
	◆ Implementation of 5G end-to-end network optimization plan;	
	◆ Verify the optimization results of 5G end-to-end network;	
	◆ 5G network performance indicators collection;	
	◆ 5G network performance improvement;	
	◆ Verify 5G network performance improvement.	
Parts		Importance(%)
3	Problem solving, innovation, creativity	15
	Participants must know and understand:	
	◆ Master the correct network analysis ideas and methods;	
	◆ Balance relationship between key network parameters and network performance indicators;	
	◆ Factors affecting the stable operation of network equipment;	
	◆ Explain industry trends and development, including new technologies, skills, etc.	
	Participants must be able to:	
	◆ Use network operation status and KPI data analysis skills.	
	◆ Single or complex information analysis;	
	◆ Single type and multiple types of data correlation.	
	◆ Independently solve problems encountered in the process of work:	
	◆ Find and solve problems in time;	
	◆ Collect and analyze information correctly;	
	◆ Select the most appropriate optimization plan and implement it.	
Parts		Importance(%)
4	5G base station Construction and Maintenance (practical operation)	30
	Notes to Participants:	
	◆ The total number of CPE users, KPN market share, KPN CPE users and other detailed demand parameters;	
	◆ Basic calculation method of 5G network planning and design;	
	◆ Multi-scene site investigation simulation tool use;	
	◆ 5G multi-scene network topology;	
	◆ Multi-scene 5G graphical (like VISIO) network topology configuration;	
	◆ 5G-related NE components (such as 5G core network, 5G BBU, 5G AAU, OMC, etc.);	
	◆ Types and applications of 5G base station installation tools;	
	◆ Specification and process of equipment unpacking, equipment counting, installation tool selection;	

	◆ Various 5G simulation equipment type system;	
	◆ 5G simulation equipment installation and connection specifications and process;	
	◆ Master the types and meanings of 5G base station service parameters;	
	◆ Master the types and meanings of 5G core network service parameters;	
	◆ The form and meaning of equipment failure;	
	Participants must be able to:	
	◆ Use the capacity estimation formula of 5G field	
	◆ Calculate frequency, downlink capacity of each sector, number of sectors and number of sites;	
	◆ Independently draw up 5G network topology diagram	
	◆ Installation and configuration of indoor BBU, outdoor AAU, GPS and other simulation hardware equipment;	
	◆ Installation and configuration of power supply, cable and other simulation hardware equipment;	
	◆ To configure the parameters of 5G base station service opening;	
	◆ 5G core network opening service parameter configuration;	
	◆ Verification of 5G services in three different scenarios, including 4K HD download, autonomous driving and smart grid	
	◆ Base station troubleshooting and verification;	
	Parts	Importance(%)
5	5G network regulation and network optimization (practical operation)	45
	Participants must know and understand:	
	◆ Edge rate requirements, modulation mode, MIMO, coding efficiency, equipment reception sensitivity, antenna gain, link budget, propagation model and other concepts	
	◆ Network users, permeability, test equipment type, DT/CQT and other concepts	
	◆ 5G indoor and outdoor environmental information collection tool usage, 5G indoor and outdoor environmental information collection preparation	
	◆ Customer complaint handling standards and principles	
	◆ 5G DT/CQT test data collection process and processing methods of problems in the collection process	
	◆ 5G test data output, backtracking, analysis, 5G wireless network test data reporting specifications	
	◆ Test log playback	
	◆ Analysis of orders, events and parameters in network testing	
	◆ Select the correct optimization scheme according to the analysis results and report	

◆ Basic architecture, hardware and software components, and functional components of 5G NETWORK management	
◆ Wireless network parameter check method, parameter modification method	
◆ Optimization verification and signaling analysis of 5G coverage, switching, delay, rate, capacity and disconnection problems	
◆ Formulate performance index improvement plans for 5G access, retention, mobile, resource and availability categories	
◆ Methods to verify the performance improvement results of 5G access class, retention class, mobile class, resource class and available class	
Participants must be able to:	
◆ Calculate the maximum path loss tolerance, obtain the maximum coverage of the cell, and then calculate the number of required base stations;	
◆ Estimate the number of base stations for network construction according to the calculation of effective users and business demand	
◆ Configure test tasks according to the specification requirements and test scenarios;	
◆ Discover network coverage, switchover, rate, disconnection, capacity and other problems;	
Find out the cause of the problem and deal with it through parameter verification and alarm analysis;	
◆ The main factors leading to the whole network performance problems, the main problem site, through parameter adjustment, alarm processing adjustment;	
◆ Configure test tasks according to the specification requirements and test scenarios;	
Total	100

3. Scoring scheme

3.1 Scoring method

The scoring of this competition is completed online by the referee team. If a contestant commits cheating or other violations during the competition, the referee will deal with it according to the contestant's violations. If the circumstances are serious, the score will be cancelled.

3.2 Scoring rules

1. The person with high total score ranks first;
2. If the total score is the same, the higher one will be ranked first in the order of task 3, task 2 and task 1. See 4.4 for the details of each task.

When the order cannot be arranged according to the above two rules, the player with a short accumulated competition time will rank first.

3.3 Evaluation basis

The full score of each task in the competition is 100 points, and the final score is calculated and added according to the proportion of each task.

Proportion of task 1: 25%; Task 1 score: platform score *25% - deduct points by subtracting points deducted.

Proportion of task 2: 30%; Score of task 2: platform score *30% - deduct points from the deducted items.

Proportion of task 3: 45%; Score of task 3: platform score *45% - deduct points from the deducted items.

The ranking is arranged from high to low according to the total score, and the total score of the competition is 100 points.

Calculation formula of final score:

Task 1 score + task 2 + task 3 = total score of the competition.

The specific evaluation is based on the following detailed scoring table:

1. Theory

Theoretical score distribution		
Question type	Choice question	Judgement question
Quantity	200	40
Score	92	8
Deduct sub items	Demerit points	depends on the plot
Total	100	

2. Practice of 5G network construction and maintenance virtual simulation system:

Detailed scoring table of 5G network construction and maintenance virtual simulation system		
Competition content	Key points of competition content	Score proportion
eMBB application scenario network deployment and operation and maintenance	eMBB scenario planning calculation	8
	eMBB Scene engineering survey and topology planning	5
	eMBB device configuration and connection	5
	eMBB Scene data configuration	8
mMTC application	mMTC Scenario planning calculation	8

scenario network deployment and operation and maintenance	mMTC Scene engineering survey and topology planning	5
	mMTC Scene device configuration and connection	5
	mMTC Scene data configuration	8
uRLLC application scenario network deployment and operation and maintenance	uRLLC Scenario planning calculation	8
	uRLLC Scene engineering survey and topology planning	6
	uRLLC Scene device configuration and connection	5
	uRLLC Scene data configuration	8
Deduct sub items	Demerit points	depends on the plot
Total	100	

3. Practice of 5G network optimization virtual simulation training system:

Detailed scoring table of 5G network optimization virtual simulation training system		
Competition content	Key points of competition content	Score proportion
5G Network optimization	Network Planning	15
	Data collection	10
	Network test	10
	End to end optimization	20
	Network wide performance analysis	25
Deduct sub items	Demerit points	depends on the plot
Total	100	

4. Virtual simulation training system

4.1 Common Precautions

Whether it is a single module or a series of independent or related modules, the virtual simulation training system can evaluate the application of knowledge, skills and behaviors defined in the standard (Skill Specification).

Combined with the scoring scheme, the purpose of the virtual simulation training system is to provide a comprehensive, balanced and real opportunity for the evaluation and scoring of the content of the competition. The relationship between virtual simulation training systems and scoring schemes and standards will be a key indicator of quality, just as standards are related to actual job performance.

The virtual simulation training system does not include aspects outside the standard, nor

does it affect the balance of scoring within the standard.

The evaluation of knowledge and understanding of the virtual simulation training system is only carried out through its application in actual operation.

4.2 Virtual simulation training system framework

Task 2: The virtual simulation training system for 5G base station construction and maintenance is composed of five relatively independent and related modules, namely network planning, site survey and survey, equipment installation, service configuration, and service verification. Items require flexible combinations.

Task 3: 5G network optimization virtual simulation training system: This module is divided into five modules: network planning, data collection, network testing, end-to-end optimization, and network-wide performance optimization, which can be flexibly combined according to actual competition requirements.

4.3 Virtual simulation training system allocation and score weight

Task 2 Scoring Table			
Competition Content	Key of competition content	Value	Weights
eMBB Application Scenario Network Deployment and Operation & Maintenance	eMBB scenario capacity calculation	8	8%
	eMBB scene engineering survey and topology planning	5	5%
	eMBB scene device configuration and connection	5	5%
	eMBB scene data configuration	15	15%
mMTC application scenario network deployment and operation and maintenance	mMTC scene capacity calculation	8	8%
	mMTC scene engineering investigation and topology planning	5	5%
	mMTC scene device configuration and connection	5	5%
	mMTC scene data configuration	15	15%
uRLLC Application Scenario Network Deployment and Operation &	uRLLC Scenario Capacity Calculation	8	8%
	uRLLC scene engineering investigation and topology planning	6	6%
	uRLLC scene device configuration and connection	5	5%

Maintenance	uRLLC scene data configuration	15	15%
Total	100		

Task 3 Scoring Table			
Competition Content	Key of competition content	Value	Weights
5G network optimization	Network Planing	15	15%
	Data collection	10	10%
	Network test	10	10%
	Signaling analysis	20	20%
	End-to-end optimization	20	20%
	Network-wide performance optimization	25	25%
Total	100		

4.4 The contents and requirements of each module

The 5G network construction and operation and maintenance technology application competition consists of three major tasks, including:

Task 1: For the 5G theory test, the online ATA platform is used, and the system automatically judges the score. Through single-choice, multiple-choice, and judgment three types of questions, the participants will be assessed on 5G key technologies, 5G network construction and optimization knowledge, and communication industry work organization and management knowledge;

Task 2: In the 5G network construction and maintenance practical exam part, the 5G network construction and maintenance simulation training system is used. The system simulates the site network planning, engineering survey, hardware configuration, wiring, etc. Cable connection, data configuration and other training sessions covering the entire business chain of 5G network construction and application deployment;

Task 3: In the 5G network optimization practical exam part, the 5G network optimization virtual simulation training system is used for practical operation. The system simulates 5G network planning, data collection, network testing, end-to-end and network-wide performance optimization and other coverage of 5G network optimization. The training link of the whole

business chain. Based on the network optimization problems that have been imported, the contestants analyze the causes of the problems according to the description of the task book, combine the problem phenomena, and cooperate to complete the network planning and network optimization problems.

Module number	Module name	Scope of work
Task 1	5G theory exam section	1. 5G technical characteristics and network architecture knowledge; 2. 5G principles and key technologies; 3. 5G standard development history (R15, R16, R17); 4. 5G frequency bands and specifications; 5. 5G physical layer and interface protocol; 6. 5G system message and signaling process; 7. Wireless network planning and optimization; 8. 5G air interface architecture; 9. 5G base station survey process; 10. Mobile communication radio wave propagation theory; 11. The principle of antenna radiation electromagnetic wave; 12. The principle of mobile antenna application.
Task 2	5G network construction and maintenance practical exam part	eMBB, uRLLC, mMTC scenarios: 1. Traffic model parameters such as the total number of CPE users, KPN market share, and the number of KPN CPE users; 2. Parameters related to 5G network planning and design; 3. 5G network model capacity calculation method; 4. 5G network coverage calculation method; 5. Function and use of multi-scenario site survey simulation tools; 6. 5G multi-scenario network topology; 7. Multi-scenario 5G graphical (VISIO-like) network topology configuration; 8. 5G-related network elements (such as 5G core network, 5G BBU, 5G AAU, OMC, etc.) components; 9. The structure and function of each network

		<p>element;</p> <ol style="list-style-type: none"> 10. Types and applications of 5G base station installation tools; 11. Specifications and procedures for equipment unpacking, equipment inventory, and selection of installation tools; 12. Various 5G simulation equipment types; 13. 5G simulation equipment installation and connection specifications and procedures; 14. 5G base station parameter configuration; 15. Master the global related parameters of the base station; 16. Master the relevant parameters of the site; 17. Master cable related parameters; 18. Master the transmission-related parameters 19. Master the relevant parameters of the community; 20. Master the fault alarms caused by different equipment faults such as AAU, BBU, single board, GPS, etc.; 21. Validate base station services, and troubleshoot problems in site survey, equipment installation, and service configuration.
<p style="text-align: center;">Task 3</p>	<p style="text-align: center;">5G network optimization practical exam part</p>	<ol style="list-style-type: none"> 1. Complete capacity planning, coverage planning, and power planning according to the 5G network planning model; 2. For 5G indoor environment information collection, it is necessary to complete the preparation for information collection, the collection of indoor wireless main equipment information, the collection of indoor supporting implementation information, and the collection of base station installation information; 3. For 5G outdoor environmental information collection, it is necessary to complete the preparation before information collection, site information collection, aerial information collection, information collection tool selection, cell information collection, and problem cell reporting; 4. 5G DT test preparation and execution, DT test preparation, DT test software/hardware configuration, DT test data collection and

		<p>indicator output;</p> <p>5.5G CQT test preparation and execution, pre-test preparation, test software/hardware configuration, test data collection;</p> <p>6. Handling of 5G test problems, solutions to common software problems, and solutions to common hardware problems;</p> <p>7. 5G network test data analysis, test data output, test data backtracking, test result data analysis, and generation of wireless network test optimization plans;</p> <p>8. Signaling analysis: LOG playback, analysis of signaling, events, and parameters in network testing, and selecting the correct optimization plan for reporting according to the analysis results.</p> <p>9. 5G end-to-end network optimization, KPI indicator analysis on the wireless side, network management alarm analysis and processing, and classification according to problems (coverage problems, 5G handover problems, 5G delay problems, 5G speed problems, 5G capacity problems, and 5G disconnection problems) Base station antenna and other parameters adjustment, result verification;</p> <p>10.5G network-wide performance improvement, network management KPI index export and analysis, alarm processing, parameter strategy adjustment and optimization, and result verification according to the type of improvement index (access type, hold type, mobile type, resource type, available type).</p>
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4.5 Announcement of virtual simulation training system

The online access address of the virtual simulation training system will be announced through the official website of the competition or other methods approved by the organizing committee.

4.6 Virtual simulation training system changes

Before the official competition, the theoretical part of the test questions and the virtual simulation training system will make no more than 30% changes to the sample questions.

5. Skills Management and Communication

5.1 Expert Group

The skills expert group is composed of chief experts, deputy chief experts and expert members, and is responsible for further revision of the technical documents and daily skills management of the remote finals of this competition.

5.2 Discussion forum

For questions related to software and hardware preparation, test environment deployment, etc. before the competition, participants can enter the forum section of the technical training competition platform for the 5G network construction and operation and maintenance technology application competition for feedback. The training exchanges, pre-competition, in-competition and post-competition exchanges will also be carried out through the forum.

Online communication will be conducted using the instant messaging tool WhatsApp (alternative: WeChat international version) and the meeting tool Zoom (alternative: Tencent conference international version).

6. Safety requirements

All participants must follow health, safety and environmental rules.

It is the responsibility of the technical representative of each participating country to ensure that competitors and experts in their country are briefed on the Code of Conduct and the Health, Safety and Environmental Policy and Requirements of the Skill Camp prior to the start of training and that these requirements can be understood and followed by the competitors.

The host country lead expert/technical expert is responsible for the requirements of the headquarters and remote areas, as well as conducting relevant training sessions for experts

and players, including compliance with hygiene and epidemiological rules, advice on preventing the spread of novel coronavirus infection (COVID-19) and local government other suggestions.

Each expert representative is responsible for preparing safety workstations for himself/herself and his/her competitors, as well as preparing health and safety training sessions for competitors.

All contestants are responsible for their own health and confirm that no disease is a taboo.

The HSE documents were published on the website a week before the start of the BRICS Future Skills Challenge 2022.

7 Materials and Equipment

7.1 Infrastructure List

(1) Recommended event equipment

Competition equipment: computer (2 units/team)

The basic configuration requirements of the machine are as follows:

Display: Resolution 1280x800

CPU: Intel Core i5 processor (above 2GHz, quad-core, the current mainstream commercial PC can be)

Memory: 8GB DDR3 1600 memory

Hard disk: 1TB hard disk

Others: Integrated 10/100/1000Mbps adaptive network card, etc.

Operating system: Windows7 or above

Browser: Chrome (latest version)

Network requirements: no less than 2M access bandwidth for each computer

(2) Technology Platform: 5G Virtual Simulation Platform

The basic configuration requirements are as follows:

No.	Device name	Quantity	Device configuration
1	Platform: 5G	2 (each	1. The competition platform includes 5G

	network construction and maintenance virtual simulation system, 5G network optimization virtual simulation training system. (Platform software)	team)	<p>wireless network, 5GC core network data configuration, and 5G wireless network optimization. Base station construction includes terminal, BBU, AAU, unified network management, NSSF, UDM, NRF, AUSF, AMF, SMF, PCF, UPF; network optimization includes site planning, information collection, network testing, end-to-end optimization, and network-wide optimization.</p> <p>2. The competition platform supports carrier-level network scale, supports at least 3 scenarios for networking, and supports the deployment of multiple equipment rooms.</p> <p>3. Support topology planning, capacity planning, equipment configuration and cable connection, data configuration functions.</p> <p>4. Support mobile Internet access, uplink and downlink rate testing and other business verification.</p> <p>5. Support common debugging and troubleshooting tools such as alarm, detection, status query, and business observation.</p>
2	Switch	4	Switch 24*Gigabit electrical port

3	Competition Server (Platform Hardware)	2	<ol style="list-style-type: none"> 1. CPU module: 4 cores 3.0GHz 2. Memory module: 2*32GB 3. Hard disk module: 2T 4. Network port: 4-port Gigabit electrical interface network card 5. 1+1 redundant power supply 6. Load the 5G simulation platform server
4	Web environment		Gigabit bandwidth

7.2 Competition environment

Site environment and standards

(1) The competition venue should be an indoor venue with a flat, bright and ventilated floor, the area of the venue should not be less than 1000 square meters, and the clear height of the venue should not be less than 3.5m;

(2) Each competition station should be able to provide independent power supply, its power supply load should not be less than 0.5KW, each competition station should be 5 m², and the table (1500*600*500 mm)

(3) Each competition station shall provide a competition platform, related tools and two computers with complete performance, and install the relevant software required for the competition.

(4) One display screen to show the game time; two referee workstation tables and one server placement table, all placed in front of the arena. The power of a single server is not less than 1000W, and the power of a single switch is not less than 100W.

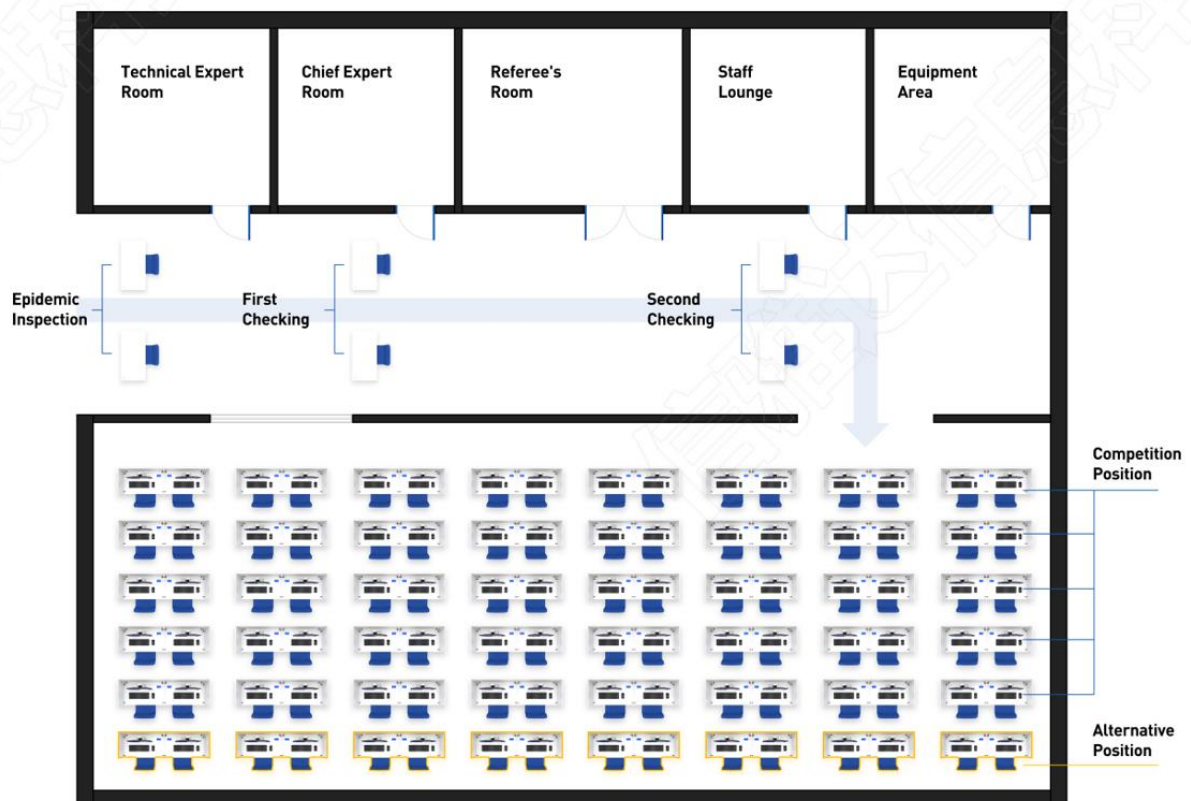
7.3 Materials, equipment and tools brought by the competitor

None

7.4 Materials and Equipment Prohibited in Skilled Areas

Any materials and equipment carried by the entrant should be declared (presented) to the expert. Experts may prohibit the use of any item that is irrelevant to the performance of the mission or that may give a competitor an unfair advantage.

7.5 Suggested Play Area and Workstation Layout



8 Skill specific rules

Skill-specific rules cannot contradict or take precedence over the rules of the game. They will provide specific details and clarity on different aspects, which vary by skill competition. They include, but are not limited to, personal computing devices, data storage devices, Internet access, work procedures, and document management and distribution.

Topic/Task	Skill-specific rules
Technology used - USB, memory stick	None

Technology used: personal laptops, tablets and mobile phones	<p>(1) Experts and interpreters can use personal laptops, tablets and mobile phones.</p> <p>(2) Competitors are not allowed to bring personal laptops, tablets or mobile phones into the competition area.</p>
Using Technology - Personal Camera	Competitors, experts and interpreters may use personal photographing and video recording equipment in the competition area only after the completion of the test project or with the consent of the chief expert.
Competitors experience technical issues during mission completion	<p>(1) In the event of a technical problem (not due to the fault of the contestant) during the implementation of the competition practical tasks, the contestant will receive additional time equal to the time from the discovery of the defect to the complete elimination of the defect.</p> <p>(2) If a technical problem is found to be caused by the entrant's fault, the entrant will not receive additional time.</p>
PPE	Personal protective equipment such as safety clothing, masks, gloves, etc., will be provided by the organizer of the competition if necessary.