worldskills

Technical Description

ICT Network Infrastructure

Skill 02

WorldSkills International, by a resolution of the Competitions Committee and in accordance with the Constitution, the Standing Orders, and the Competition Rules, has adopted the following minimum requirements for this skill for the WorldSkills Competition.

The Technical Description consists of the following:

1 Introduction

1.1 Name and description of the skill competition

1.1.1 The name of the skill competition is

ICT Network Infrastructure

1.1.2 Description of the associated work role(s) or occupation(s)

The occupations related to ICT Network Infrastructure play a fundamental role in supporting modern society and shaping the future. Cutting-edge technologies such as AI, Big Data, and Cloud Services - all of which make our lives more convenient and sustainable - are entirely dependent on reliable, high-quality information networks. The responsibility for building these foundations lies with this profession.

Information network cabling involves constructing the infrastructure of data centers, mobile networks, Local Area Networks (LANs), Cable TV (CATV), industrial automation systems, and smart buildings. Among these, data centers are often called the “heart of the digital society,” as they power cloud services, video streaming, online gaming, e-commerce, financial transactions, and even essential government services. If a data center fails, entire societies can be disrupted, making the technicians who design and install these networks vital guardians of stability and progress.

With the rapid expansion of IoT and IIoT, demand is growing for ever more sophisticated and flexible network solutions. An ICT Network Infrastructure technician is not merely a cable installer, but an “architect of the digital infrastructure” who understands client needs, designs and builds networks in compliance with international standards, and ensures their reliability through maintenance and testing. Their work directly underpins business success, economic activity, and the daily lives of millions of people.

For young people, this profession offers the chance to work in an invisible yet powerful field that literally keeps the world running. Every smartphone connection, social media post, video stream, online class, or telemedicine consultation relies on the networks they create. The sense of achievement in knowing one’s work enables modern life - and the opportunity to apply these skills globally - makes this career both meaningful and exciting.

1.1.3 Number of Competitors per team

Information Network Cabling is a single Competitor skill competition.

1.1.4 Age limit of Competitors

The Competitors must not be older than 25 years in the year of the Competition.

1.2 The relevance and significance of this document

This document contains information about the standards required to compete in this skill competition, and the assessment principles, methods, and procedures that govern the competition.

Every Expert and Competitor must know and understand this Technical Description.

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

1.3 Associated documents

Since this Technical Description contains only skill-specific information it must be used in association with the following:

- WSI – Code of Ethics and Conduct
- WSI – Competition Rules
- WSI – WorldSkills Occupational Standards framework
- WSI – WorldSkills Assessment Strategy
- WSI online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations
- WorldSkills Standards and Assessment Guide (skill-specific)

2 The WorldSkills Occupational Standards (WSOS)

2.1 General notes on the WSOS

The WSOS specifies the knowledge, understanding, skills, and capabilities that underpin international best practice in technical and vocational performance. These are both specific to an occupational role and also transversal. Together they should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSOS).

The skill competition is intended to reflect international best practice as described by the WSOS, to the extent that it can. The Standard is therefore a guide to the required training and preparation for the skill competition.

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

The Standard is divided into distinct sections with headings and reference numbers added.

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

Through the Test Project, the Marking Scheme will assess only those skills and capabilities that are set out in the WorldSkills Occupational Standards. They will reflect the Standards as comprehensively as possible within the constraints of the skill competition.

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, if this does not distort the weightings assigned by the Standards.

2.2 WorldSkills Occupational Standards

Section		Relative importance (%)
1	**Work organization and management**	**5**
	The individual needs to know and understand: • Health and safety legislation, obligations, regulations, and documentation • Basic first aid • The situations when personal protective equipment (PPE) must be used • The correct procedures for working with laser technologies • The purposes, uses, care, maintenance, safe handling, and storage of equipment in an ESD friendly environment • The importance of integrity and security when dealing with user equipment and information	

Section		Relative importance (%)
	• The importance of safe disposal of waste for re-cycling • The significance of accuracy, checking, and attention to detail in all working practices • The importance of methodical working practices • Research methods and techniques • The value of managing one's own continuing professional development • The negative impacts on businesses and organizations of poor or unreliable network installations • Codes and standards	
	The individual shall be able to: • Comply with health and safety standards, rules, and regulations • Adhere to relevant codes and/or standards • Maintain a safe working environment including the use of ladders for access to high work • Check and use personal protective equipment correctly at all times • Identify and use the appropriate personal protective equipment for ESD • Select, use, clean, maintain, and store tools and equipment safely and securely • Plan work areas to maximize efficiency and maintain the discipline of regular tidying • Verify any additional site-specific safety requirements before performing any work. • Always practice a zero-tolerance ethos when it comes to the safety of yourself and others. • Always use visible barriers when securing the work area. • Deploy stop work authority procedures immediately if you detect a potential harmful situation to yourself or others. • Regularly schedule and re-schedule and multi-task according to changing priorities • Work efficiently and check progress and outcomes regularly • Actively work to fulfil industry certification requirements and keep up to date with 'license to practice' requirements (determined by their own country) and to complete regular Continued Professional Development (CPD) • Use thorough and efficient research methods to support knowledge growth • Proactively try new methods, and systems, and embrace change	
2	**Communication and interpersonal skills**	**5**
	The individual needs to know and understand: • The importance of listening as part of effective communication • The roles and requirements of colleagues and the most effective methods of communication	

Section		Relative importance (%)
	• The importance of building and maintaining productive working relationships with colleagues and managers • Techniques for effective teamwork • Techniques for resolving misunderstandings and conflicting demands • The process for managing tension and anger to resolve difficult situations	
	The individual shall be able to: • Use strong listening and questioning skills to deepen understanding of complex situations • Manage consistently effective verbal and written communications with colleagues • Proactively contribute to the development of a strong and effective team • Share knowledge and expertise with colleagues and develop supportive learning cultures • Manage tensions and disputes, providing confidence that problems can be resolved • Discuss customers' requirements and provide Expert advice and consultancy • Liaise with other professionals and suppliers to create a fully tailored package that fulfils customers' needs • Respect the impact that cabling activity can have on a busy working environment, showing consideration and care, and causing least disruption in all circumstances • Prepare construction plans and quotations for planned work and present to customers • Explain the sustainability of the cabling system • Arrive on time for all scheduled events • Adhere to site dress code and safety requirements	
3	**Planning and design**	**15**
	The individual needs to know and understand: • Terminology and symbols used in specifications and drawings recognized by the industry • Principles and conventions of technical drawings and documentation • Installation requirements, specifications, and relevant standards • Quality assurance and quality planning principles • Installation planning methodologies • Properties, types, and performance characteristics of copper and optical fibre cables • Emerging cabling technologies, including high-density, bend-insensitive, and MPO/MTP systems	

Section		Relative importance (%)
	• Environmental and safety requirements related to cabling design • National and international regulations related to electrical and telecom installations • Information network technologies and their applications across industries • Functional and physical requirements of modern ICT devices (e.g. IoT, wireless APs, sensors) • Fundamentals of AI-based monitoring systems and cloud-managed infrastructures • Life cycle and sustainability aspects of cabling systems • Mathematics, physics, and basic principles of electricity and data transmission	
	The individual shall be able to: • Develop and follow installation plans • Conduct site surveys and gather environmental data • Plan and specify installations in accordance with best practice criteria and project requirements • Work independently by organizing and prioritizing tasks • Prepare, design, interpret, and analyze technical drawings and specifications • Select appropriate tools, test equipment, and materials for the job • Choose suitable cabling media based on usage and environmental conditions • Interpret and apply manufacturers' instructions and technical documents • Perform inventory and material control for project execution • Develop and follow installation management plans • Design labeling schemes in accordance with organizational standards • Interpret and analyze complex or multidisciplinary drawings and specifications • Develop and implement quality control plans to meet required standards • Solve a range of problems, including integration and coordination issues • Assess work sites to identify and mitigate risks and hazards • Evaluate building structures to optimize cable routing and minimize impact • Develop and follow site-specific safety plans	

Section		Relative importance (%)
	• Apply design principles to various industrial network environments • Incorporate considerations for AI systems, cloud platforms, and SDN architectures • Design cabling systems that support next-generation ICT devices and connectivity • Evaluate designs from a sustainability and life-cycle perspective • Maximize sustainability in planning, materials selection, and process design • Complete all required documentation accurately and on time	
4	**ICT network infrastructure installation**	**30**
	The individual needs to know and understand: • Types, characteristics, and use cases of copper and optical fibre cables • Methods of routing, fixing, and terminating copper and fibre cabling • Functional use of fibre connection hardware such as closures, splice boxes, and patch panels • Practical considerations for different fibre applications (e.g. FTTH, PON, access networks, outdoor installations) • Physical installation requirements in commercial, industrial, and residential environments • Component relationships and connection sequences in copper and fibre structured cabling systems • Spatial and pathway systems (e.g. TR, ER, TE, cable trays, conduits, fibre channels) and their configuration • On-site safety practices, cleanliness, and organisation during installation • Procedures for removing abandoned cables and restoring the site after installation • Visual inspection and cleaning techniques for fibre connectors • Principles of polarity and methods to verify correct polarity throughout the system • Practical thresholds for pulling tension, minimum bend radius, fill ratio, and cable support • Handling procedures for advanced cable types (e.g. high-density MPO, bend-insensitive fibre) • Installation requirements for cloud-managed devices, AI-based terminals, and IoT sensors	
	The individual shall be able to: • Install structured cabling systems in various environments, including offices, industrial sites, homes, and data centres • Perform installations for building systems including lighting, access control, security, fire alarms, and IIoT	

Section		Relative importance (%)
	• Set up telecommunications spaces (TR, ER, TE) and cable pathway systems (tray, conduit, fibre channel, etc.) • Pull and route cables according to installation standards: ◦ Apply correct pulling tensions ◦ Observe minimum bend radius ◦ Maintain appropriate fill ratios and support methods • Install equipment such as racks, patch panels, network devices, fibre closures, splice boxes, and TOs • Terminate copper cabling (UTP, STP, coaxial) using IDC and appropriate techniques for multi-pair, 4-pair, and single-pair cables • Splice and terminate optical fibre cables using: ◦ Fusion splicing ◦ Mechanical splicing ◦ Field-installable connectors • Perform high-density cabling installation (e.g. MPO/MTP) and handle bend-insensitive cables properly • Implement full physical installation of both copper and optical structured cabling systems • Connect modern devices such as AI-enabled systems, cloud-managed access points, and IoT sensors • Visually inspect and clean all optical fibre connectors before termination • Verify and maintain correct polarity across the system architecture • Perform labelling and documentation according to project requirements • Safely remove abandoned or obsolete cabling • Clean and restore the site after completing installation • Maintain tools and perform related administrative tasks • Maintain a safe, clean, and client-respectful working environment throughout installation • Maximize sustainability in materials handling and on-site installation processes	
5	**Wireless technology and connectivity**	**10**
	The individual needs to know and understand: • Wi-Fi standards, frequency bands, and channel configuration principles • Wireless network planning concepts, including coverage, interference, and AP placement • Communication protocols used in smart environments (e.g. Zigbee, Z-Wave, Bluetooth LE, LoRa, Thread) • Architecture and components of smart homes, smart offices, and smart factories • Integration principles for distributed building services (e.g. lighting, HVAC, security, access control) • IoT and IIoT concepts, including device roles, addressing, and interoperability	

Section		Relative importance (%)
	• Power-over-Ethernet (PoE) and power supply considerations for wireless and smart devices • Cloud-based platforms and centralized management systems for smart environments • Security principles for wireless systems, including encryption, authentication, and access control • Visual inspection and cleaning procedures for wireless-connected hardware	
	The individual shall be able to: • Install and configure wireless communication systems (e.g. Wi-Fi access points) • Conduct field surveys for wireless signal coverage, interference, and performance • Plan and configure Wi-Fi channels, SSIDs, VLANs, and segmentation for secure connectivity • Install and configure smart devices in home, office, and industrial environments • Integrate smart systems with cloud-based or centralized control platforms • Deploy and configure distributed systems such as lighting, HVAC, access control, and monitoring • Select and apply suitable communication protocols based on device type and system design • Install and verify PoE-powered smart and wireless devices, ensuring proper power allocation • Configure wireless system security, including WPA encryption and authentication methods • Perform testing, verification, and basic troubleshooting of wireless and smart systems • Clean, inspect, and maintain wireless hardware and associated components • Maintain documentation, labelling, and site cleanliness related to wireless system installation	
6	**Measurement, testing, and quality control**	**20**
	The individual needs to know and understand: • Common sources of faults and performance issues in network infrastructure systems • Business impacts and operational risks resulting from system performance degradation • Requirements for technical documentation, quality assurance reporting, and labelling • Principles of test result validation and interpretation • Tools and methods for testing copper and optical fibre cabling systems (e.g. continuity, loss, polarity)	

Section		Relative importance (%)
	• Procedures and tools for Wi-Fi signal measurement, coverage analysis, and interference detection • Standards and best practices for quality verification in network installations • Structure and management of administrative and quality control records	
	The individual shall be able to: • Perform testing of copper and optical fibre cabling systems using appropriate test equipment – e.g. wire map testers, continuity testers, OTDRs, certification testers • Verify physical and transmission parameters, including polarity, continuity, attenuation, and return loss • Conduct Wi-Fi signal surveys using site survey tools and spectrum analyzers • Assess Wi-Fi coverage, signal strength, channel utilization, and interference • Document and interpret Wi-Fi survey results using heatmaps or standardized reporting formats • Validate test results against project specifications and applicable standards • Complete test reports, quality control logs, and installation records accurately and clearly • Label tested components and cabling to support ongoing maintenance and system navigation • Provide end users and clients with documentation and guidance on tested system capabilities and limitations • Implement minor updates or adjustments necessary to meet evolving quality or performance requirements	

Section		Relative importance (%)
7	**Troubleshooting and Preventive Maintenance**	**15**
	The individual needs to know and understand: • Principles, functions, and limitations of diagnostic and testing tools • Common causes of faults in copper, fibre, and wireless network systems • Procedures for identifying, isolating, and addressing faults in network infrastructure • Certification and inspection standards for structured cabling systems • Maintenance schedules, inspection frequency, and replacement criteria • Use of remote monitoring systems (e.g. SNMP, syslog, cloud dashboards) for predictive maintenance • Environmental and sustainability considerations in maintenance activities (e.g. repair vs replace decisions) • Documentation requirements for fault events, maintenance actions, and customer communication	
	The individual shall be able to: • Select and use appropriate diagnostic tools based on media, system type, and fault symptoms • Inspect and evaluate copper and fibre cabling systems for damage, wear, or degradation • Certify optical fibre systems using Optical Loss Test Sets (OLTS) and Optical Time Domain Reflectometers (OTDR) • Certify copper systems using cable or LAN testers in accordance with industry standards • Assess fibre connector end-face quality using appropriate inspection tools (e.g. microscope, interferometer) • Clean and re-terminate connectors or replace components as required • Interpret remote monitoring data, error logs, or performance alerts to detect emerging issues • Optimize performance of wireless networks by analyzing interference, channel use, and signal degradation • Apply corrective actions to restore full system functionality • Execute scheduled preventive maintenance tasks to reduce downtime risk • Apply sustainability principles during maintenance, such as component reuse and minimal e-waste • Document all maintenance and fault resolution activities clearly and systematically • Provide users or clients with guidance on maintenance schedules, observed issues, and recommended actions	
	Total	**100**

3 The Assessment Strategy and Specification

3.1 General guidance

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform.

Expert assessment practice lies at the heart of the WorldSkills Competition. For this reason, it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the WorldSkills Competition falls into two broad types: Measurement and Judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding.

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, to demonstrate their quality and conformity with the Standards.

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

4 Assessment Design and Practice

4.1 General guidance

This section describes the role and place of the Marking Scheme, how the Experts will assess Competitors' work as demonstrated through the Test Project, and the procedures and requirements for marking.

The Marking Scheme is the pivotal instrument of the WorldSkills Competition, in that it ties assessment to the standard that represents each skill competition, which itself represents a global occupation. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards.

By reflecting the weightings in the Standards, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill competition and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, initial Test Project design can be based on the outline Marking Scheme. From this point onwards the Marking Scheme and Test Project should be developed together.

Section 2.1 above indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards, if there is no practicable alternative.

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more Independent Test Project Designer(s) with relevant expertise. In these instances, the Marking Scheme and Test Project are unseen by Experts until immediately before the start of the skill competition, or competition module. Where the detailed and final Marking Scheme and Test Project are designed by Experts, they must be approved by the whole Expert group prior to submission for independent validation and quality assurance. Please see the Competition Rules for further details.

Experts and Independent Test Project Designers are required to submit their Marking Schemes and Test Projects for review, verification, and validation well in advance of completion. They are also expected to work with their Skill Advisor, reviewers, and verifiers, throughout the design and development process, for quality assurance and in order to take full advantage of the CIS's features.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition. Skill Advisors actively facilitate this process.

4.2 Assessment Criteria

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived before, or in conjunction with, the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards; in others they may be different. There will normally be between five and nine Assessment Criteria. Whether or not the headings match, the Marking Scheme as a whole must reflect the weightings in the Standards.

Assessment Criteria are created by the person or people developing the Marking Scheme, who are free to define the Criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). **The Assessment Criteria, the allocation of marks, and the assessment methods, should not be set out within this Technical Description. This is because the Criteria, allocation of marks, and assessment**

methods all depend on the nature of the Marking Scheme and Test Project, which is decided after this Technical Description is published.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria and Sub Criteria.

The marks allocated to each Criterion will be calculated by the CIS. These will be the cumulative sum of marks given to each Aspect within that Assessment Criterion.

4.3 Sub Criteria

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a WorldSkills marking form. Each marking form (Sub Criterion) contains Aspects to be assessed and marked by Measurement or Judgement, or both Measurement and Judgement.

Each marking form (Sub Criterion) specifies both the day on which it will be marked, and the identity of the marking team.

4.4 Aspects

Each Aspect defines, in detail, a single item to be assessed and marked, together with the marks, and detailed descriptors or instructions as a guide to marking. Each Aspect is assessed either by Measurement or by Judgement.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it. The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the Standards. This will be displayed in the Mark Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1 refers.)

		CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE
		A	B	C	D	E	F	G	H			
STANDARDS SPECIFICATION SECTION	1	5.00								5.00	5.00	0.00
	2		2.00					7.50		9.50	10.00	0.50
	3								11.00	11.00	10.00	1.00
	4			5.00						5.00	5.00	0.00
	5				10.00	10.00	10.00			30.00	30.00	0.00
	6		8.00	5.00				2.50	9.00	24.50	25.00	0.50
	7			10.00				5.00		15.00	15.00	0.00
TOTAL MARKS		5.00	10.00	20.00	10.00	10.00	10.00	15.00	20.00	100.00	100.00	2.00

4.5 Assessment and marking

There is to be one marking team for each Sub Criterion, whether it is assessed and marked by Judgement, Measurement, or both. The same marking team must assess and mark all Competitors. Where this is impracticable (for example where an action must be done by every Competitor simultaneously, and must be observed doing so), a second tier of assessment and marking will be put in place, with the approval of the Competitions Committee Management Team. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (Section 4.6 refers.)

4.6 Assessment and marking using Judgement

Judgement uses a scale of 0-3. To apply the scale with rigour and consistency, Judgement must be conducted using:

- benchmarks (criteria) for detailed guidance for each Aspect (in words, images, artefacts, or separate guidance notes). This is documented in the Standards and Assessment Guide.
- the 0-3 scale to indicate:
  - 0: performance below industry standard
  - 1: performance meets industry standard
  - 2: performance meets and, in specific respects, exceeds industry standard
  - 3: performance wholly exceeds industry standard and is judged as excellent

Three Experts will judge each Aspect, normally simultaneously, and record their scores. A fourth Expert coordinates and supervises the scoring, and checks their validity. They also act as a judge when required to prevent compatriot marking.

4.7 Assessment and marking using Measurement

Normally three Experts will be used to assess each Aspect, with a fourth Expert supervising. In some circumstances the team may organize itself as two pairs, for dual marking. Unless otherwise stated, only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect. To avoid errors in calculation or transmission, the CIS provides a large number of automated calculation options, the use of which is mandated.

4.8 The use of Measurement and Judgement

Decisions regarding the choice of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test Project.

4.9 Skill assessment strategy and procedures

WorldSkills is committed to continuous improvement including reviewing past limitations and building on good practice. The following skill assessment strategy and procedures for this skill competition take this into account and explain how the marking process will be managed.

The Experts are divided into marking groups to assess each section of the marking criteria.

Every completed module is marked on the same day in which it was completed.

The modules are:

A - Optical fiber cabling system

B - Copper cabling system

C - Smart home/office and FTTX application

D - Speed challenge

E - Troubleshooting and maintenance

Each assessment criteria includes the following:
quality, working process and procedure, functionality, fundamental installation, knowledge, and safety.

5 The Test Project

5.1 General notes

Sections 3 and 4 govern the development of the Test Project. These notes are supplementary.

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the applied knowledge, skills, and behaviours set out in each section of the WSOS.

The purpose of the Test Project is to provide full, balanced, and authentic opportunities for assessment and marking across the Standards, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme, and Standards will be a key indicator of quality, as will be its relationship with actual work performance.

The Test Project will not cover areas outside the Standards or affect the balance of marks within the Standards other than in the circumstances indicated by Section 2. This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards. Section 2.1 refers.

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work. The Test Project will not assess knowledge of WorldSkills rules and regulations.

Most Test Projects and Marking Schemes are now designed and developed independently of the Experts. They are designed and developed either by the Skill Competition Manager, or an Independent Test Project Designer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

The information provided below will be subject to what is known at the time of completing this Technical Description, and the requirement for confidentiality.

Please refer to the current version of the Competition Rules for further details.

5.2 Format/structure of the Test Project

The Test Project is a series of five (5) standalone modules.

5.3 Test Project design requirements

Test Projects should reflect the purposes, structures, processes, and outcomes of the occupational role they are based on. They should aim to be a small-scale version of that role. Before focusing on practicalities, SMTs should show how the Test Project design will provide full, balanced, and authentic opportunities for assessment and marking across the Standards, as set out in Section 5.1.

The Test Project consists of a mandatory task, and several optional tasks following completion of the mandatory task. The mandatory task should be designed to enable 80% or more Competitors to complete. Necessary information to do the mandatory task is disclosed prior to the competition as senarios; and Competitors do their work based on diagram(s) presented on the respective Competition Day.

The Competitors should be able to deliver accordingly to customers' various demands.

Module 1 - Optical fibre cabling system

Install optical cabling systems for customer premises such as industrial premises, data centre, FTTH services. The following skills are required:

• Project management,
• Quality management,
• Working process,
• Optical fibre cabling and management,
• Install equipment, devices, and materials of the optical cabling system,
• Measurement, and
• Maintenance.

Module 2 - Copper cabling system

Install generic cabling systems for customer premises such as office remises, Industrial premises, Single tenant home, Data centre and Distributed building services. The following skills are required:

• Project management,
• Quality management,
• Working process,
• Copper cabling and management,
• Install equipment, devices,and materials of the copper cabling system,
• Measurement, and
• Maintenance.

Module 3 - Smart home/office applications

Install smart home/office equipment and applications and improve the connectivity. The following skills are required:

• Install a FTTH system,
• Install smart home/office system,
• Set up Wifi and zigbee applications,
• xTP/coaxial/optical fibre cabling and management,
• Configuration of network devices, and
• Measurement.

Module 4 - Optical fiber speed test

Splice optical fibres by fusion splicer. The following skill is required:

• Optical fibers fusion splicing (single core and ribbon fiber) as quickly as possible.

Module 5 - Troubleshooting for copper and/or fibre cabling

Find and repair faults in generic cabling system. The following skills are required:

• Measurement,
• Fault finding, and
• Repair the system.

For some or all of the tasks in Module 5, Competitors use Mixed Reality (MR) devices.

All Test Project proposals shall comply with this Technical Description and the Test Project scenario. In addition, at the time of the proposal of all the Test Project modules, the Independent Test Project Designer must check if their modules can be enforced and, also indicate the details.

5.4 Test Project coordination and development

The Test Project MUST be submitted using the templates provided by WorldSkills International (www.worldskills.org/expertcentre). Use the Word template for text documents and DWG template for drawings.

5.4.1 Test Project coordination (preparation for Competition)

Coordination of the Test Project/modules will be undertaken by the Skill Competition Manager.

5.4.2 Who develops the Test Project/modules

The Test Project/modules are developed by an Independent Test Project Designer (ITPD) in collaboration with the Skill Competition Manager.

5.4.3 When is the Test Project developed

The Test Project/modules are developed according to the following timeline:

Time	Action
Fifteen (15) months prior to the Competition	The ITPD is identified and a Confidentiality Agreement between WSI and the ITPD is organized.
Six (6) months prior to the Competition	Generic Competitor pre-competition information and the scenario of the mandatory module is circulated on the WorldSkills website, without any technical or detailed information.
Two (2) months prior to the Competition	The Test Project documents are sent to the WorldSkills International Skills Competitions Administration Manager.
At the Competition on C-2	The Test Project/modules are presented to Competitors, Experts, and Interpreters.

5.5 Test Project initial review and verification

The purpose of a Test Project is to create a challenge for Competitors which authentically represents working life for an outstanding practitioner in an identified occupation. By doing this, the Test Project will apply the Marking Scheme and fully represent the WSOS. In this way it is unique in its context, purpose, activities, and expectations.

To support Test Project design and development, a rigorous quality assurance and design process is in place (Competition Rules sections 10.6-10.7 refer.) Once approved by WorldSkills, the Independent Test Project Designer (ITPD) is expected to identify one or more independent expert(s), and trusted individuals initially to review the Independent Test Project Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.

A Skill Advisor will ensure and coordinate this arrangement, to guarantee the timeliness and thoroughness of both initial review, and verification, based on the risk analysis that underpins Section 10.7 of the Competition Rules.

5.6 Test Project validation

The Skill Competition Manager coordinates the validation of the Test Project/modules and will ensure that it can be completed within the material, equipment, knowledge, and time constraints of Competitors.

5.7 Test Project circulation

The Test Project/modules are not circulated prior to the Competition. The Test Project/modules are presented to Experts and Competitors on C-2.

Generic Competitor pre-competition information and the scenario of the mandatory module is circulated six (6) months prior to the Competition via the WorldSkills website. Technical or detailed information on the modules is circulated three (3) months. prior to the Competition via the Workdskills website.

5.8 Test Project change

Due to the Test Project being developed by an Independent Test Project Designer (ITPD), there is no change required to be made to the Test Project/modules at the Competition. Exceptions are amendments to technical errors in the Test Project documents and according to infrastructure limitations.

5.9 Material or manufacturer specifications

Specific material and/or manufacturer specifications required to allow the Competitor to complete the Test Project will be supplied by the Competition Organizer and are available from www.worldskills.org/infrastructure located in the Expert Centre. However, note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

6 Skill management and communication

6.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the WorldSkills skill-specific Discussion Forum. (http://forums.worldskills.org). Skill related decisions and communication are only valid if they take place on the WorldSkills Discussion Forum. The Chief Expert (or an Expert Lead appointed by the Skill Management Team) will be the moderator for this Discussion Forum. Refer to the Competition Rules for the timeline of communication and competition development requirements.

6.2 Competitor information

All information for registered Competitors is available from the Competitor Centre (www.worldskills.org/competitorcentre).

This information includes:

- Competition Rules
- Technical Descriptions
- Mark Summary Form (where applicable)
- Test Projects (where applicable)
- Infrastructure List
- WorldSkills Health, Safety, and Environment Policy and Regulations
- Other Competition-related information

6.3 Test Projects and Marking Schemes

Circulated Test Projects will be available from www.worldskills.org/testprojects and the Competitor Centre (www.worldskills.org/competitorcentre).

6.4 Day-to-day management

The day-to-day management of the skill competition during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team. The Skill Management Team comprises the Skill Competition Manager, Chief Expert, and the Expert Leads. The Skill Management Plan is progressively developed in the six (6) months prior to the Competition and finalized at the Competition. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).

6.5 General best practice procedures

General best practice procedures clearly delineate the difference between what is a best practice procedure and skill-specific rules (section 9). General best practice procedures are those where Experts and Competitors CANNOT be held accountable as a breach to the Competition Rules or skill-specific rules which would have a penalty applied as part of the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System. In some cases, general best practice procedures for Competitors may be reflected in the Marking Scheme.

Topic/task	Best practice procedure
The process of and timing of the release of modules of an uncirculated Test Project	• The modules of the uncirculated Test Project will be published on C-2 to Competitors, Experts, and Interpreters. • After all the translations are finished, it will be published to all Experts at the same time on C-3. • Chief Expert see the Test Project ahead of Experts to prepare for the C-4 presentation to all Experts, the composition of the marking team, and the preparation of materials and equipment immediately after being published on C-3.
The process of and timing for the translation of the Test Project	• An Interpreter can translate from C-4 to C-3 until the time specified by the Skill Competition Manager. If the translation is not completed, extension may be permitted, but each event described in the Skill Management Plan must be prioritized. (Time extension is allowed after all events are over)
The tools that an Interpreter can use for the translation process	• An Interpreter can use a specified personal computer that has been inspected by the Skill Competition Manager and Chief Expert for the translation process. • Software necessary for translation (Word, Excel, etc., including dictionary and translation software) may be used. An internet connection may be used if the software requires it. • Email software and browser cannot be used, and they cannot be installed.
The process for marking by marking teams	• Before the start of marking, the leaders of each marking team (designated by the Skill Competition Manager and Chief Expert) must confirm and coordinate with each other to ensure consistency and quality of assessment, and that they all have the same understanding and agreement of the standards. • During the entire marking process, the marking team leader must immediately check with the Skill Competition Manager and Chief Expert in case of any doubt. • After the marking, the marking team must report to the Skill Competition Manager and Chief Expert about the marking especially what was evaluated, what was not evaluated (including the reason), and what was discussed at the time of marking, according to the defined format/template. • If requested by the Skill Competition Manager and Chief Expert, the marking team leader must discuss the marking details with them (complaints handling etc.).
The process for assessing suggestion and complaint	• If there is a request regarding marking (including matters that should be evaluated, matters that should not be evaluated, procedures violations, etc.), all Experts should describe in a prescribed format/template and submit it to the Skill Competition Manager in writing. Verbal complaints will not be accepted.

Topic/task	Best practice procedure
	• After discussing the submitted contents within the Skill Competition Manager and Chief Expert, the Skill Competition Manager will reply in writing. • Similarly, Experts make complaints regarding marking results in writing. Complaints must be made within the designated time.

7 Skill-specific safety requirements

7.1 Personal Protective Equipment

Refer to WorldSkills Safety Policy and Regulations for Host country or region regulations.

Task	Safety glasses with side protection	Sturdy shoes with closed toe and no heel	Tight fitting work clothes (long trousers)	Leather gloves Full hand cover protecive gloves	Vinyl gloves
General PPE for safe areas		√			
Cabling (Outdoor)		√		√	
Fibre jelly cleaning		√			√
All installation and termination	√	√	√	√	

- All Competitors must bring their own Personal Protective Equipment (PPE).
- All Competitors must wear safety glasses when working with fibre, or when using any hand tools, power tools, or machinery that may cause or create chips or fragments capable of injuring the eyes;
- All Competitors must wear sturdy closed-toe shoes at all time within the work area;
- All Competitors must wear vinyl gloves when removing gel from loose tube cables;
- All Competitors must wear full hand cover gloves when using a sharp knife, etc.

8 Materials and equipment

8.1 Infrastructure List

The Infrastructure List details all equipment, materials, and facilities provided by the Competition Organizer.

The Infrastructure List is available at www.worldskills.org/infrastructure.

The Infrastructure List specifies the items and quantities requested by the Skill Management Team for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

At each Competition, the Skill Management Team must review and update the Infrastructure List in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions of any increases in space and/or equipment.

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition for the upcoming WorldSkills Competition.

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring – they are specified below.

8.2 Competitors toolbox

Competitors are not allowed to send a toolbox to the Competition. All tools are provided by the Competition Organizer.

8.3 Materials, equipment, and tools supplied by Competitors

It is not applicable for Competitors to bring materials, equipment, and tools to the Competition. However, Competitors are allowed to bring ten (10) personal tools in the morning of C-2 on Familiarization Day as defined in the table below. It is recommended that these tools be brought in the luggage of the Competitor or purchased locally.

Description	Quantity	Photo
Combination Pliers	1	
Pliers	1	

Description	Quantity	Photo
Nipper	1	
Fibre buffer stripper (025/09)	1	
Cable jacket stripping tool	1	
Optical cable stripper	1	  
Fibre loose tube stripper	1	
Fibre cord stripper	1	

Furthermore, Competitors are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

If the Competitor wants to use special jigs or tools, then it must be posted on the WorldSkills Discussion Forum prior to the Competition with a picture and explanation of its use. A majority of Experts must agree.

8.4 Materials, equipment, and tools supplied by Experts

Experts are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

Experts are responsible that Interpreters bring their own PPE.

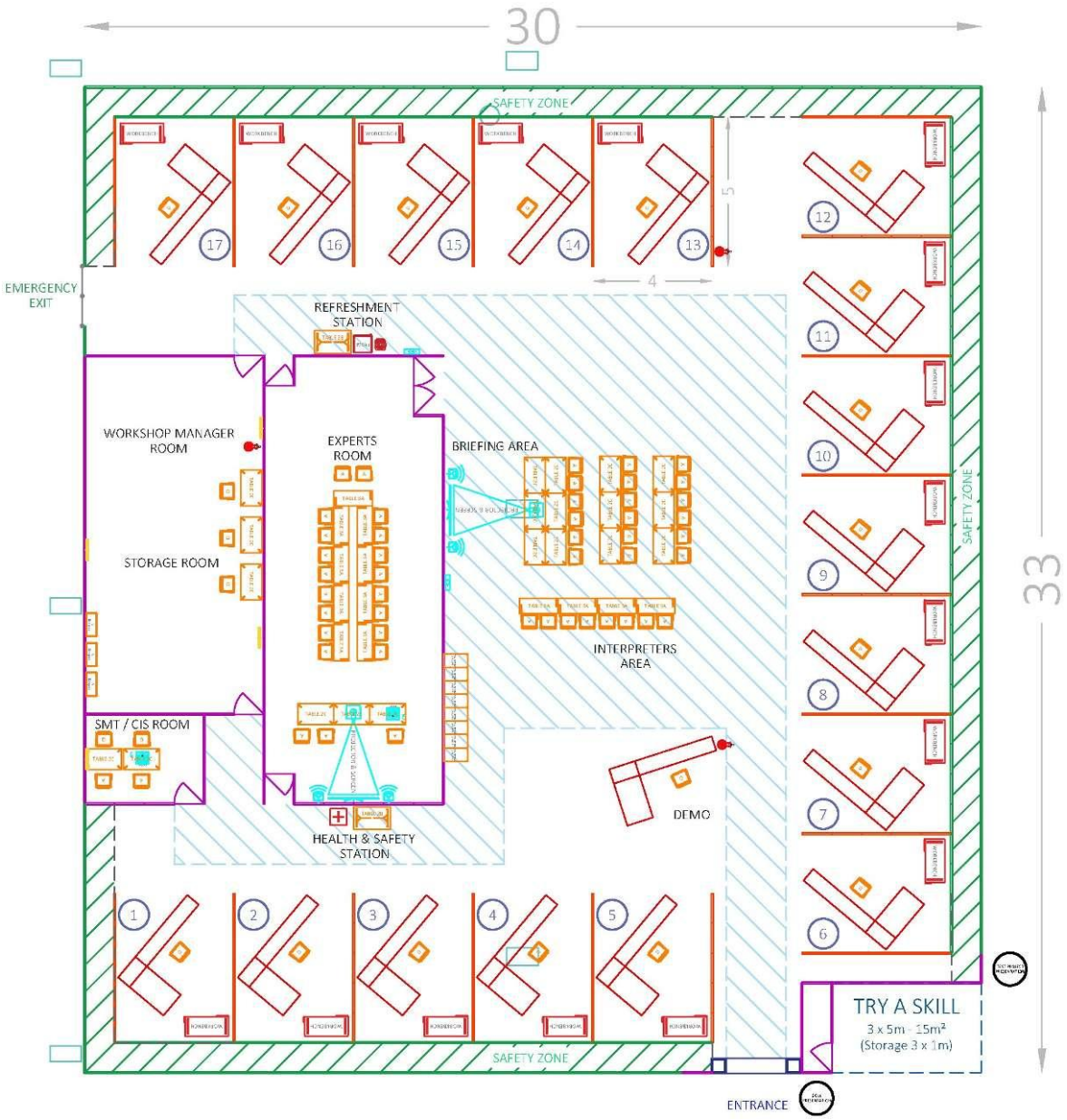
8.5 Materials and equipment prohibited in the skill area

Competitors and Experts are prohibited to bring any materials or equipment not listed in section 8.3 and section 8.4.

8.6 Proposed workshop and workstation layouts

Workshop layouts from previous competitions are available at www.worldskills.org/sitelayout.

Example workshop layout



Please note that this is an example of the layout and is not definitive. Approximate space for work area of a Competitor is 5 m x 4 m.

Set up one booth to use for measurement training and demonstration purposes.

A workstation should meet the following requirements. These requirements should be examined and approved by the Skill Competition Manager no later than six (6) months prior to the Competition. The requirements are disclosed to Experts immediately after approval by the Skill Competition Manager.

- With assumption of Campus structured cabling system;
- Including the followings;
- Cable ladder, TO, board to set a termination box, 19-inch rack (two racks), fibre cable tray (upper part of the workstation), fibre channel, flexible conduit;
- Front panel should consist of multiple boards, which can be replaced;
- Be robust;

Detailed design should have been disclosed.

9 Skill-specific rules

9.1 General notes

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from skill competition to skill competition. This includes but is not limited to personal IT equipment, data storage devices, Internet access, procedures and workflow, and documentation management and distribution. Breaches of these rules will be solved according to the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System.

9.2 Skill-specific rules

Topic/task	Skill-specific rule
Use of technology – USB, memory sticks	• Competitors are not to have memory devices of any kind in the workshop except for DSX's memory. • Experts and Interpreters are not allowed to have memory devices in the Expert room except as expressly permitted by the Skill Competition Manager and Chief Expert. • The Skill Competition Manager and Chief Expert is exempt from this rule.
Use of technology – personal laptops, tablets and mobile phones	• Skill Competition Manager, Chief Expert, Experts and Interpreters are allowed to use personal laptops, tablets, and mobile phones in the Expert room only. • Competitors are not allowed to bring personal laptops, tablets, or mobile phones into the workshop. • Competitors must leave them on C-2 and the full duration of competition hours (C1 to C4) with the ESR before the start of the competition. If needed, such as during lunchtime, they can make a request of the Expert and use them if permitted.
Use of technology – personal photo and video taking devices	• Skill Competition Manager, Chief Expert, and Experts are allowed to use personal photo and video taking devices in the workshop for references record for marking during the competition. • Competitors and Interpreters are not allowed to use personal photo and video taking devices in the workshop. Competitors must leave them on C-2 and the full duration of competition hours (C1 to C4) with the ESR before the start of the competition. If needed, such as during lunchtime, they can make an offer the Expert in charge of management and use them if permitted.
Tools/infrastructure	• The only tools to be brought by the Competitor are those listed on the approved tool lists in the Technical Description and the WorldSkills Discussion Forum.
Templates, aids, etc.	• Competitors must not bring jigs, etc. into the workshop, except those approved in the WorldSkills Discussion Forum.

Topic/task	Skill-specific rule
	• Competitors may not use any jigs etc. except for those created during the competition time of C-2 and C1 to C4. In addition, the created jigs must be left inside the workshop.
Installation method	• Competitors must install: • According to the guidelines and manuals which has been distributed. • By procedures that are intended at the real installation field.
Drawings, recording information	• No drawings are to be used except for those provided in the Test Project.

10 Expert knowledge and experience

10.1 Requirements

Experts appointed for this skill competition must have the following knowledge and experience for the appropriate occupation or work role as documented in **section 1.1.2**.

Minimum qualification

Experts shall hold one or more of the following minimum qualifications related to ICT network infrastructure:

- A nationally recognized vocational or professional qualification in information and communications technology (ICT), network cabling, or telecommunications infrastructure;
- A technical diploma or associate degree in electrical, electronics, or computer networking disciplines;
- An equivalent qualification recognized by an accredited national education, vocational training, or certification authority.

NOTE: Qualifications should reflect both theoretical knowledge and practical skills related to physical layer infrastructure, including copper, fibre optic, and wireless systems.

Expected industry and/or TVET experience

Experts shall have at least one of the following:

- A minimum of five years of full-time, industry-based experience in the planning, installation, testing, or maintenance of network cabling systems in commercial, industrial, or data centre environments; or
- A minimum of three years of full-time instructional experience in a recognized Technical and Vocational Education and Training (TVET) institution, delivering practical training in ICT network infrastructure.

NOTE: Experience may include involvement in project management, quality assurance, or commissioning of structured cabling systems.

Areas of specialism (if applicable)

Depending on national contexts, areas of expert specialism may include but are not limited to:

- Design and deployment of structured cabling systems;
- Fibre optic cable splicing, termination, and testing;
- Wireless LAN survey and optimization (e.g. IEEE 802.11 standards);
- Certification of cabling systems using OTDR, OLTS, and LAN testers;
- Sustainability practices in ICT network design and installation in accordance with ISO/IEC 14763-5
- Application of ISO/IEC standards, including 11801, 14763 series.

NOTE: While specialization is not mandatory, subject-matter expertise supports knowledge transfer and benchmarking during international competition and skills assessment.

11 Visitor and media engagement

11.1 Engagement methods

Following is a list of possible ways to maximize visitor and media engagement:

- Try-a-Skill;
- Display screens;
- Test Project descriptions;
- Enhanced understanding of Competitor activity;
- Competitor profiles;
- Career opportunities;
- Daily reporting of competition status.

Out of consideration for other Member countries and regions, continuous filming of a Competitor is not allowed.

12 Sustainability

12.1 Sustainable practices

This skill competition will focus on the sustainable practices below:

- Recycling;
- Use of “green” materials;
- Use of completed Test Projects after Competition.

13 References for industry consultation

13.1 General notes

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognized best practice in industry and business. To do this WorldSkills approaches a number of organizations across the world that can offer feedback on the draft Description of the Associated Role and WorldSkills Occupational Standards on a two-yearly cycle.

In parallel to this, WSI consults three international occupational classifications and databases:

- ISCO-08: (http://www.ilo.org/public/english/bureau/stat/isco/isco08/)
- ESCO: (https://ec.europa.eu/esco/portal/home)
- O*NET OnLine (www.onetonline.org/)

13.2 References

This WSOS most closely relates to Telecommunications Technician: https://esco.ec.europa.eu/en/classification/occupation?uri=http://data.europa.eu/esco/isco/C352, and a junior version of Telecommunications Engineering Specialists: https://www.onetonline.org/link/summary/15-1241.01

These links also enables adjacent occupations to be explored.

ILO 3522: Telecommunications Engineering Technicians

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2026.

Organization	Contact name
Black Box	David M. Richards, Quality and Training Manager
China Telecom Shanghai Branch	Xu Jun, Senior technical of communication lineman
Fujikura Co., LTD	Xiaojie Li, Sales Manager
Guangdong VCOM Education Technology Co., LTD	Xiao Shifan, Director of Research and Development
Macau Telecom	Ou Jiawen, Senior Manager
Xi'an Kaiyuan Electronics Industrial Co., LTD	Wang Gongru, Founder, Chairman, CEO

14 Appendix

14.1 Appendix information

Not applicable.