**Intelligent Network and AI for CSPs**

## 1. Basic Information

1. (Single Choice)Where is your organization located? （ ）
2. China
3. Asia
4. Europe
5. North America
6. Latin America
7. Middle East
8. Africa
9. Oceania
10. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Single Choice)Please indicate the number of customers served by your organization?（ ）
2. Fewer than 5 million
3. 5 million to 25 million
4. 25 million to 50 million
5. More than 50 million
6. (Multiple Choice) What is your organization's primary line of business?（ ）
7. Mobile operator
8. Fixed operator
9. Digital service provider (IoT, smart cities, etc.)
10. Converged Operator
11. Other (pleaseadd more info below)

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| Additional Information(please provide additional information here below):  |

1. (Single Choice)Please indicate the number of network operation and maintenance engineers in your organization?（ ）
2. Fewer than 1 thousand
3. 1 thousand to 3 thousand
4. 3 thousand to 5 thousand
5. 5 thousand to 7 thousand
6. 7 thousand to 9 thousand
7. More than 10 thousand
8. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

## 2. Requirements for intelligent network

1. (Single Choice)Please indicate your current degree of intelligent network in production（ ）
2. Take a wait-and-see attitude
3. In the proof-of-concept phase
4. We've used AI technology in some scenarios to reduce costs and increase efficiency
5. Not only having adopted AI technology in some of the current network scenarios, but also formed a long-term network intelligence overall plan
6. (Multiple Choice)What are the target application scenarios of your organization's intelligent network? How about the priority?

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| --- | --- | --- | --- | --- | --- |
|  | Highest priority | High priority | Medium priority | Low priority | Don’t have target application |
| Intelligent network planning (planning network capacity, networking, etc.) |  |  |  |  |  |
| Intelligent service assurance (ensure service quality to better meet user experience) |  |  |  |  |  |
| Intelligent network operation and maintenance(ensure network quality and stable network operation) |  |  |  |  |  |
| Intelligent network optimization(optimize network and service quality) |  |  |  |  |  |
| Intelligent energy efficiency management(save energy consumption in data centers and wireless devices) |  |  |  |  |  |
| Intelligent network security(ensure network security and prevent malicious damage) |  |  |  |  |  |
| Intelligent network element autonomy(embedded AI capability in network and network element ) |  |  |  |  |  |
| Other (please add more info) |  |  |  |  |  |
| Radio Site Optimization  |  |  |  |  |  |
| Network topology optimization including traffic , SLA , PoP migration etc |  |  |  |  |  |

1. (Multiple Choice)In the following intelligent network planning applications, the scenarios you are concerned about are（ ）
	1. Network capacity forecast：use AI algorithm to predict network capacity
	2. Automated network planning and construction：use AI algorithm to automatically plan the topology and routing of network construction
	3. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice)In the following intelligent service assurance applications, the scenarios you are concerned about are（ ）
	1. Intelligent identification of terminal type：IoT terminal types, behavior pattern recognition technical solutions and product prototypes based on network data, laying the foundation for scene-oriented IoT operation and maintenance
	2. Intelligent service recognition：use AI technology to distinguish network traffic of different services
	3. Intelligent QoS strategy optimization：based on strategy control architecture of intelligent analysis, research intelligent QoS strategy optimization mechanism based on service quality prediction
	4. SLA intelligent perception and assurance：aiming at SLA key indicators, combined with AI technology to achieve high-precision measurement of SLA indicators, anomaly detection, change trend prediction, anomaly root cause analysis, etc.
	5. Voice/video perception intelligent assessment：voice/video service quality assessment, anomaly discovery and location analysis to improve operators’ voice/video service perception and monitoring capabilities
	6. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice)In the following intelligent network operation and maintenance applications, the scenarios you are concerned about are（ ）
	1. Intelligent complaint handling：considering network, complaint, business, user and other multi-dimensional data, build end-to-end self-service from user intention perception, network fault location to fault resolution, and improve complaint handling efficiency as well as user experience
	2. Intelligent performance operation and maintenance：start with the three stages of performance-side problem discovery, failure root cause analysis, and failure receipt verification to improve performance operation and maintenance efficiency
	3. Intelligent fault operation and maintenance：according to the goal of network fault discovery and processing efficiency improvement, give network health evaluation
	4. Corelate application VNF and Infra level Metrics and give suggestions for KQI improvement
	5. Smart cost audit：realize smart electricity bill auditing with AI technology and big data technology
	6. Intelligent maintenance quality inspection：use AI to assist staff in quality control
	7. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) In the following intelligent network optimization applications, the scenarios you are concerned about are（ ）
	1. Intelligent parameter optimization：build network element feature profile and neighboring cell correlation modeling, optimize intelligent SON parameters
	2. Intelligent wireless coverage optimization：use machine learning to learn the best behavior of the network state, and optimize the wireless coverage through parameter optimization
	3. Intelligent capacity optimization：predict 5G capacity and realize precise formulation of wireless network resource adjustment plan
	4. Intelligent routing adjustment：use AI technology to predict network traffic and select the optimal path for traffic
	5. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) In the following intelligent energy efficiency management applications, the scenarios you are concerned about are（ ）
	1. Smart wireless energy saving：realize energy saving of smart wireless base station through AI technology
	2. Energy saving in smart data centers：develop new control algorithms based on big data and artificial intelligence technology to achieve the best overall energy efficiency of data center
	3. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) In the following intelligent network security applications, the scenarios you are concerned about are（ ）
	1. User anomaly detection：perform mining and analysis of operation and maintenance operation log data, complete anomaly detection and analysis of user operation logs, and ensure the security of network operation and maintenance operations
	2. Use AI technology to detect cyber attacks, such as DDOS and other cyber attacks
	3. Use AI technology to detect pornographic and terrorist-related content and information on the internet
	4. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) In the following intelligent network element autonomy applications, the scenarios you are concerned about are（ ）
	1. Wireless intelligent load balancing：combine wireless information and intelligent algorithms to select opportunity and target cell for load balancing
	2. Real-time business QoE prediction and intelligent wireless scheduling optimization：combine wireless information and intelligent algorithms to improve the experience of operators' services (for example high-definition video, etc.)
	3. Intelligent autonomy of core network elements：research intelligent autonomy of core network elements
	4. NWDAF：intelligent network data analysis
	5. SON：Self-Organizing Networks
	6. Transport NW optimization specially on Metro back haul
	7. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

## 3. Intelligent network strategy

1. (Single Choice) The overall strategy for improving the level of intelligent network is（ ）
2. According to the requirement of application scenarios, provide specific intelligent network solutions for each scenario
3. Firstly, make an overall plan for intelligent network, then evaluate the urgency of each scenario, and provide solutions step by step according to scenarios
4. Build a unified AI platform suitable for all intelligent network application scenarios, and then provide solutions for each scenarios
5. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Single Choice) If you consider implementing intelligent network by scenario, how to achieve the coordination and unification of your organization's solutions for different application scenarios?（ ）
2. Different application scenarios have different intelligent solutions, there are no need to consider coordination and unification issues
3. Will consider classifying and dividing the network professional field, coordinating the unified implementation of cross-vendor application scenarios, and coordinating the different solutions of different manufacturers at the network element level to achieve unified collaboration
4. By building a general AI platform suitable for all intelligent network application scenarios, provide a unified implementation plan for cross-manufacturer and cross-professional application scenarios, and achieve their coordination
5. The business systems like ERP/CC/Order Managmeent and NW must be coorelated in AI system
6. Implements an End to end process using AI tools
7. Other (please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) What functions need to be provided by the generic intelligent network platform?（ ）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Very important, this feature must be provided | Important, it is better to provide this feature | Relatively important, this function is optional | Not important, this function is not needed | Supplement |
| Provide basic AI algorithms, algorithm frameworks, training capabilities, etc. through a unified intelligent platform | ○Model training○Model validation○Generic algorithm framework | ○Model training○Model validation○Generic algorithm framework  | ○Model training○Model validation○Generic algorithm framework  | ○Model training○Model validation○Generic algorithm framework  |  |
| Unified R&D and deployment of general intelligent network capabilities for various intelligent network applications | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | (Supplement other functions for network AI capabilities and modeling components) |
| Based on intelligent network capabilities, provide common business capabilities and applications in the network field  | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | (Supplement other functions for network business capabilities and application components) |
| Define data access capabilities and provide raw data, training data and subject data to other functions or capabilities through access and processing of external data sources | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | (Supplement other functions for data access component) |
| Other (please add more info) |  |  |  |  |  |

## 4. Intelligent network application

1. (Multiple Choice) Below are 6 proposed levels of intelligent network. Which fit your current level of capability or when do you hope to have the capability? （ ）

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| --- | --- | --- | --- | --- |
| Level 0- ManualOperation &Maintenance: O&M personmanuallyexecutes alldynamic tasks | ○We have reached this level | ○We see a clear path to get to this level within 2 years | ○We see a clear path to get to this level within 4 years | ○We don't see a clear path to this level and don't have a proposed timeline |
| Level 1- AssistedOperation &Maintenance: automaterepeated actionsor redundantinformationeliminationbased on rules | ○We have reached this level | ○We see a clear path to get to this level within 2 years | ○We see a clear path to get to this level within 4 years | ○We don't see a clear path to this level and don't have a proposed timeline |
| Level 2- Partial Intelligent Network: automatic analysis and automatic decision-making based on dynamic strategies in some scenarios | ○We have reached this level | ○We see a clear path to get to this level within 2 years | ○We see a clear path to get to this level within 4 years | ○We don't see a clear path to this level and don't have a proposed timeline |
| Level 3- Conditional Intelligent Network: automatic analysis of dynamic strategies in specific scenarios, pre-designed scenarios to assist manual decision-making | ○We have reached this level | ○We see a clear path to get to this level within 2 years | ○We see a clear path to get to this level within 4 years | ○We don't see a clear path to this level and don't have a proposed timeline |
| Level 4- High Intelligent Network: the system realizes a complete closed loop of dynamic strategy, pre-designed scenarios and the system automatically completes requirement mapping | ○We have reached this level | ○We see a clear path to get to this level within 2 years | ○We see a clear path to get to this level within 4 years | ○We don't see a clear path to this level and don't have a proposed timeline |
| Level 5- Full Intelligent Network: all scenarios systems complete all closed loops, and the systems automatically completerequirement mapping | ○We have reached this level | ○We see a clear path to get to this level within 2 years | ○We see a clear path to get to this level within 4 years | ○We don't see a clear path to this level and don't have a proposed timeline |

1. (Multiple Choice) In your organization, what is the current status of intelligent network applications?（ ）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | The intelligent application has been provided and applied in production | The intelligent application has been provided and piloted in production | The intelligent application has been provided, at laboratory verification stage | Partially provide this intelligent application | Not provide relevant application | Other situations (please add explanation) |
| Intelligent network planning | ○Network capacity forecast○Automated network planning and construction | ○Network capacity forecast○Automated network planning and construction | ○Network capacity forecast○Automated network planning and construction | ○Network capacity forecast○Automated network planning and construction | ○Network capacity forecast○Automated network planning and construction |  |
| Intelligent service assurance | ○Intelligent identification of terminal type○Intelligent QoS strategy optimization○Intelligent service recognition○SLA intelligent perception and assurance○Voice/video perception intelligent assessment | ○Intelligent identification of terminal type○Intelligent QoS strategy optimization○Intelligent service recognition○SLA intelligent perception and assurance○Voice/video perception intelligent assessment | ○Intelligent identification of terminal type○Intelligent QoS strategy optimization○Intelligent service recognition○SLA intelligent perception and assurance○Voice/video perception intelligent assessment | ○Intelligent identification of terminal type○Intelligent QoS strategy optimization○Intelligent service recognition○SLA intelligent perception and assurance○Voice/video perception intelligent assessment | ○Intelligent identification of terminal type○Intelligent QoS strategy optimization○Intelligent service recognition○SLA intelligent perception and assurance○Voice/video perception intelligent assessment |  |
| Intelligent network operation and maintenance | ○Intelligent complaint handling○Intelligent performance operation and maintenance○Intelligent fault operation and maintenance○Smart cost audit○User anomaly detection○Intelligent maintenance quality inspection | ○Intelligent complaint handling○Intelligent performance operation and maintenance○Intelligent fault operation and maintenance○Smart cost audit○User anomaly detection○Intelligent maintenance quality inspection | ○Intelligent complaint handling○Intelligent performance operation and maintenance○Intelligent fault operation and maintenance○Smart cost audit○User anomaly detection○Intelligent maintenance quality inspection | ○Intelligent complaint handling○Intelligent performance operation and maintenance○Intelligent fault operation and maintenance○Smart cost audit○User anomaly detection○Intelligent maintenance quality inspection | ○Intelligent complaint handling○Intelligent performance operation and maintenance○Intelligent fault operation and maintenance○Smart cost audit○User anomaly detection○Intelligent maintenance quality inspection |  |
| Intelligent network optimization | ○Intelligent parameter optimization○Intelligent capacity optimization○Intelligent wireless coverage optimization○Intelligent routing adjustment | ○Intelligent parameter optimization○Intelligent capacity optimization○Intelligent wireless coverage optimization○Intelligent routing adjustment | ○Intelligent parameter optimization○Intelligent capacity optimization○Intelligent wireless coverage optimization○Intelligent routing adjustment | ○Intelligent parameter optimization○Intelligent capacity optimization○Intelligent wireless coverage optimization○Intelligent routing adjustment | ○Intelligent parameter optimization○Intelligent capacity optimization○Intelligent wireless coverage optimization○Intelligent routing adjustment |  |
| Intelligent network element autonomy | ○Wireless intelligent load balancing○Real-time business QoE prediction and intelligent wireless scheduling optimization○Intelligent wireless scheduling optimization○SON Self-Organizing Networks○NWDAF intelligent network data analysis | ○Wireless intelligent load balancing○Real-time business QoE prediction and intelligent wireless scheduling optimization○Intelligent wireless scheduling optimization○SON Self-Organizing Networks○NWDAF intelligent network data analysis | ○Wireless intelligent load balancing○Real-time business QoE prediction and intelligent wireless scheduling optimization○Intelligent wireless scheduling optimization○SON Self-Organizing Networks○NWDAF intelligent network data analysis | ○Wireless intelligent load balancing○Real-time business QoE prediction and intelligent wireless scheduling optimization○Intelligent wireless scheduling optimization○SON Self-Organizing Networks○NWDAF intelligent network data analysis | ○Wireless intelligent load balancing○Real-time business QoE prediction and intelligent wireless scheduling optimization○Intelligent wireless scheduling optimization○SON Self-Organizing Networks○NWDAF intelligent network data analysis |  |
| Other(please add more info) |  |  |  |  |  |  |

1. (Multiple Choice) In your organization, what is the current application situation of the intelligent network platform?（ ）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | The intelligent application has been provided and applied in production | The intelligent application has been provided and piloted in production | The intelligent application has been provided at laboratory verification stage | Partially provide this intelligent application | Not provide relevant application |
| Provide basic AI algorithms, algorithm frameworks, training capabilities, etc. through a unified intelligent platform | ○Model training○Model validation○Generic algorithm framework | ○Model training○Model validation○Generic algorithm framework  | ○Model training○Model validation○Generic algorithm framework  | ○Model training○Model validation○Generic algorithm framework  | ○Model training○Model validation○Generic algorithm framework  |
| Unified R&D and deployment of general intelligent network capabilities for various intelligent network applications | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization | ○Time series forecast○Abnormal detection○Strategy optimization○Root cause analysis○Spatial search optimization |
| Based on intelligent network capabilities, provide common business capabilities and applications in the network field  | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers | ○Intelligent business recognition○Intelligent network operation and maintenance○Intelligent network optimization○Energy saving in smart data centers |
| Define data access capabilities and provide raw data, training data and subject data to other functions or capabilities through access and processing of external data sources | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction | ○Data authentication○Data desensitization○Data anomaly detection○Data storage○Data destruction |
| Other (please add more info) |  |  |  |  |  |

1. (Multiple Choice) In your organization, how much the overall operation and maintenance efficiency has been improved after the deployment of intelligent network applications on the productionnetwork compared with no use of AI technology?（ ）How much has the operation and maintenance engineers reduced?（ ）
2. 10%~20%，10%~20%
3. 20%~30%，20%~30%
4. 30%~40%，30%~40%
5. 40%~50%，40%~50%
6. More than 50%，more than 50%
7. Other(pleaseadd more info below)

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| Additional Information(please provide additional information here below): |

## 5. Challenges in intelligent network

1. (Multiple Choice) What are the main difficulties in achieving intelligent network large-scale promotion and systematic improvement（ ）
2. Lack of a controllable network experiment environment to verify the effect of intelligent network applications
3. Lack of a research and development environment for open intelligent network applications that allows intelligent applications to be quickly developed, iteratively upgraded and released (devops)
4. Lack of quantitative indicators for the effect of intelligent network applications and 3rd party testing and certification services, unable to evaluate and certify the effect of intelligent applications, and build intelligent application markets and intelligent ratings
5. Lack of AI talents and technical reserves within company
6. Lack of shared and open network data sets
7. Can't trust complete intelligent network control
8. The transformation of network elements needs to be promoted by standardization organizations, and the cycle is very long
9. Lack of unified and trusted data and its normalization
10. How to make sure data cleaning is correct and legal
11. Other(please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) If providing intelligent network application certification services to evaluate the effects of intelligent applications, the objects of evaluation and certification should include（ ）
2. Intelligent network AI algorithm
3. Intelligent network service
4. Intelligent network element
5. Other(please add more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) In your opinion, what aspects need to be considered when building a test and certification service for intelligent network solutions（ ）
2. Effectiveness evaluation and testing system for intelligent applications (test cases, data collection, quantitative indicators)
3. Open intelligent network application certification laboratory, providing a unified surrounding test environment
4. General automatic evaluation devops pipeline for 3rd party software
5. Other(please add more info below)

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| Additional Information(please provide additional information here below): |

## 6. Intelligent network ecology

1. (Single Choice) What is the current status of research and development of the intelligent network platforms and intelligent network applications that your organization has achieved（ ）
2. All self-developed
3. Mainly self-developed, partly dependent on integrators
4. A small number of self-developed, most rely on integrators
5. No self-developed, all rely on integrators to provide
6. Other(pleaseadd more info below)

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| Additional Information(please provide additional information here below): |

1. (Multiple Choice) In your organization, the standard organization you currently participate in and the technical points of concern include（ ）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | High level concern | Intermediate level concern | Low level concern | Not concern | Other situations (please add) |
| 3GPP | ○Wireless network self-optimizing SON○Intelligent core network NWDAF○Intent-driven network○Management data analysis MDAF | ○Wireless network self-optimizing SON○Intelligent core network NWDAF○Intent-driven network○Management data analysis MDAF | ○Wireless network self-optimizing SON○Intelligent core network NWDAF○Intent-driven network○Management data analysis MDAF | ○Wireless network self-optimizing SON○Intelligent core network NWDAF○Intent-driven network○Management data analysis MDAF |  |
| ETSI | ○Experiential network intelligence（ENI）○Zero intervention network and service management（ZSM） | ○Experiential network intelligence（ENI）○Zero intervention network and service management（ZSM） | ○Experiential network intelligence（ENI）○Zero intervention network and service management（ZSM） | ○Experiential network intelligence（ENI）○Zero intervention network and service management（ZSM） |  |
| TMF | ○Autonomous network | ○Autonomous network | ○Autonomous network | ○Autonomous network |  |
| ITU | ○Future network and 5G machine learning（FG-ML5G focal group） | ○Future network and 5G machine learning（FG-ML5G focal group） | ○Future network and 5G machine learning（FG-ML5G focal group） | ○Future network and 5G machine learning（FG-ML5G focal group） |  |
| GSMA | ○AI in Network | ○AI in Network | ○AI in Network | ○AI in Network |  |
| Other (please add more info) |  |  |  |  |  |

1. (Multiple Choice) The open source organizations that your organization currently participates in and the technical points of interest include（ ）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | High level concern | Intermediate level concern | Low level concern | Not concern | Other situations (please add) |
| ONAP | ○Cloudized network management orchestration○ Intelligent network closed loop control | ○Cloudized network management orchestration○ Intelligent network closed loop control | ○Cloudized network management orchestration○ Intelligent network closed loop control | ○Cloudized network management orchestration○ Intelligent network closed loop control |  |
| Acumos AI | ○Unified standard for AI model communication○Distributed model market | ○Unified standard for AI model communication○Distributed model market | ○Unified standard for AI model communication○Distributed model market | ○Unified standard for AI model communication○Distributed model market |  |
| PNDA | ○Big data analysis application | ○Big data analysis application | ○Big data analysis application | ○Big data analysis application |  |
| EDGE AI | ○Edge distributed artificial intelligence | ○Edge distributed artificial intelligence | ○Edge distributed artificial intelligence | ○Edge distributed artificial intelligence |  |
| TIP | ○Open core network○Open wireless network○Network element microservice | ○Open core network○Open wireless network○Network element microservice | ○Open core network○Open wireless network○Network element microservice | ○Open core network○Open wireless network○Network element microservice |  |
| OAI | ○Open source 4G network element○Open source 5G network element○Open source containerized network element | ○Open source 4G network element○Open source 5G network element○Open source containerized network element | ○Open source 4G network element○Open source 5G network element○Open source containerized network element | ○Open source 4G network element○Open source 5G network element○Open source containerized network element |  |
| Other (please add more info) |  |  |  |  |  |