TM Forum

ANLAV Report

Vodafone Türkiye

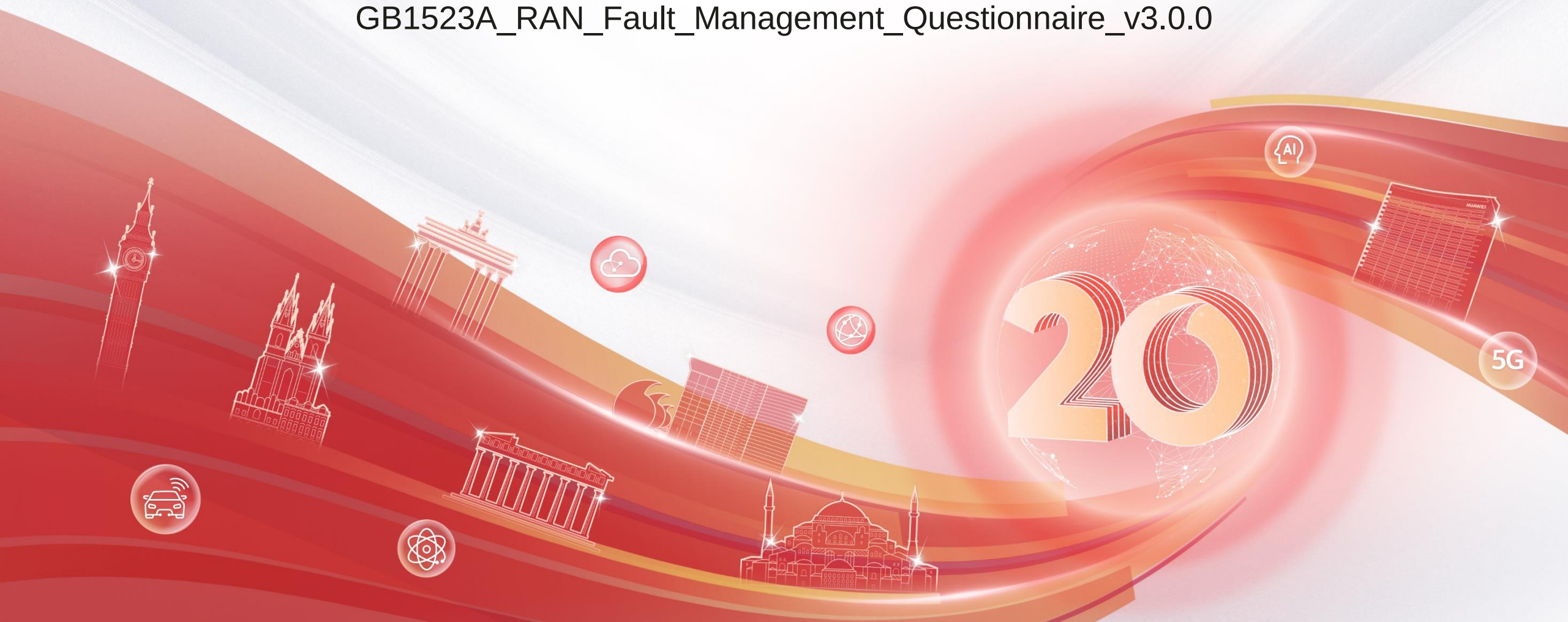
GB1523A – RAN Fault Management

Version: 3.0.0

Score: 3.4 (3.38)

Vodafone Türkiye RAN Fault Management ANL Assessment

GB1523A_RAN_Fault_Management_Questionnaire_v3.0.0



RAN Fault Management ANL Assessment Overall Score

Cognitive Activity (IAADE)	Service Capability	Weight	Sub-Scenario Answer (refers to 3GPP TS 28.111)					Final Score
			Equipment (should include but not limit to Transceiver problem, Receiver Failure)	**Processing Error** (should include but not limit to Invalid parameter, Software Environment Problem)	**Communications** (should include but not limit to Fronthaul error, Backhaul error, IP/GPS clock error, Antenna feeder error)	**Environmental** (should include but not limit to External power supply failure, External equipment failure)	**Security** (should include but not limit to Key Expired, Authentication Failure, Unauthorised Access Attempt)	
			15%	15%	30%	30%	10%	
Intent	Intent-driven	10%	B	B	B	B	B	**3.4**
Awareness	Data collection & Alarm filtering	10%	A	A	A	A	A	
	Fault Prediction	15%	C	B	C	B	B	
Analysis	Fault identification & Impact analysis	20%	A	A	A	A	A	
	Demarcation & Locating	20%	A	A	B	A	A	
	Solution generation	10%	A	A	A	A	A	
Decision	Evaluation and decision-making	10%	A	A	A	A	A	
Execution	Solution implementation	5%	B	B	B	B	B	

Intent-driven

Service Capability	Weight	Question	Option A	√ Option B	Option C	Option D
Intent-driven	10%	Does the wireless network fault management system have the capability of automatically generating fault management task targets, policies and evaluating the implementation effect based on intent? Note: Based on the specified fault management intent (such as the out-of-service duration), the system determine the fault management targets (such as the proportion of pre-event trouble tickets and fault locating duration) and fault management policy (such as redundancy backup).	The system automatically generates fault management task targets and policies based on intent by using intelligent model. Fault management targets and policies need to be manually confirmed. The system automatically evaluates the implementation effect.	The system automatically generates fault management task targets based on predefined rules. Fault management targets and policies need to be manually defined. The effect is manually evaluated after the intent is implemented.	Fault management task targets and policies are manually defined based on expertise. Manually evaluate the effect after the intention is implemented, assisted by tools and system.	Manually set fault management task targets and evaluate the effect.

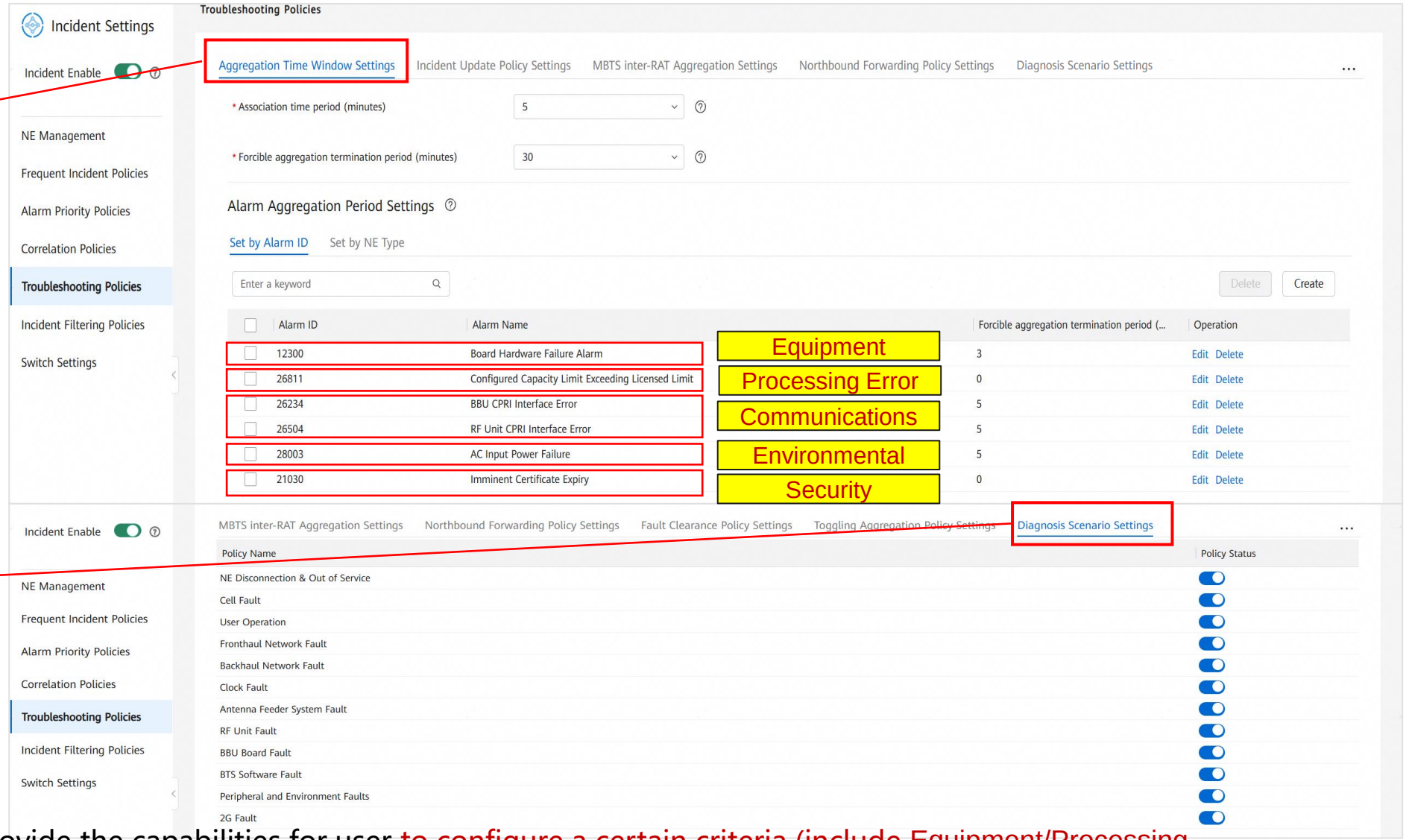
Equipment	Processing Error	Communications	Environmental	Security
B	B	B	B	B

Intent-driven

Evidence：

For alarm aggregation

For auto diagnosis & auto RCA



The System provide the capabilities for user to configure a certain criteria (include Equipment/Processing Error/Communications/Environmental/Security) to carry out automation such as aggregate the alarm, auto diagnose the root

Data collection & Alarm filtering

Service Capability	Weight	Question	√ Option A	Option B	Option C	Option D
Data collection & Alarm filtering	10%	Does the wireless network fault management system support automatic data collection & alarm filtering in various fault scenarios?	The system automatically collects data (alarm, configuration, and performance data etc.), and correlates alarms. All data required are automatically collected, no need for additional manually collected data.	The system collects data (alarm, configuration, and performance data etc.), and correlates alarms based on manually defined rules	Manually selects and uses the system to collect data and correlate alarms.	

Equipment	Processing Error	Communications	Environmental	Security
A	A	A	A	A

Data collection & Alarm filtering

Evidence： Alarm data collection & correlation(Alarm data)

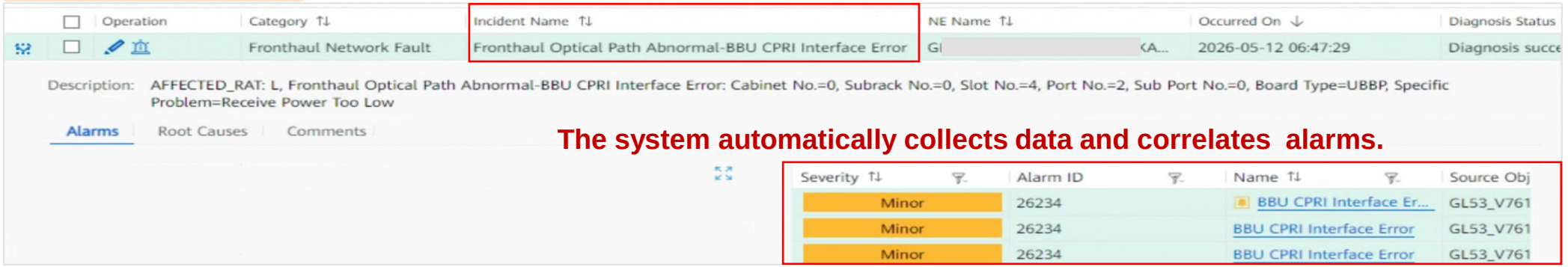
Equipment - A

The system automatically collects data and correlates alarms.

Processing Error - A

The system automatically collects data and correlates alarms.

Communications - A

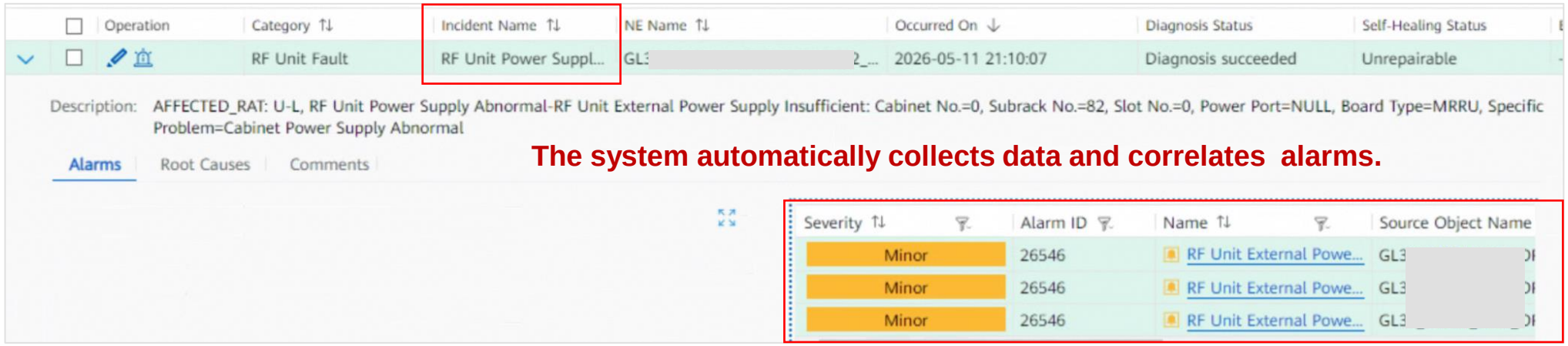


The system automatically collects data and correlates alarms.

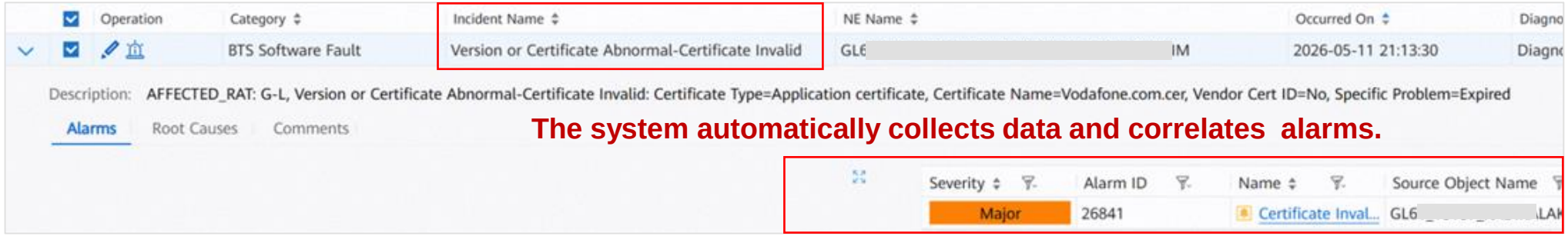
Data collection & Alarm filtering

Evidence： Alarm data collection & correlation(Alarm data)

Environmental - A



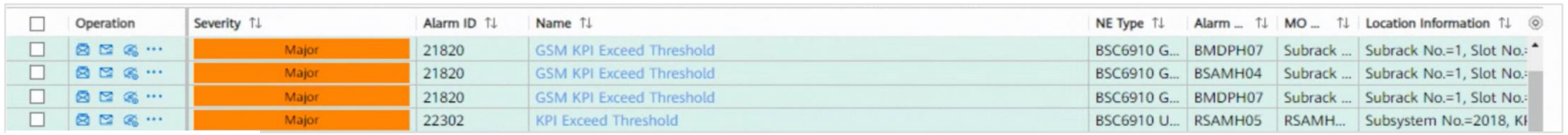
Security - A



Data collection & Alarm filtering

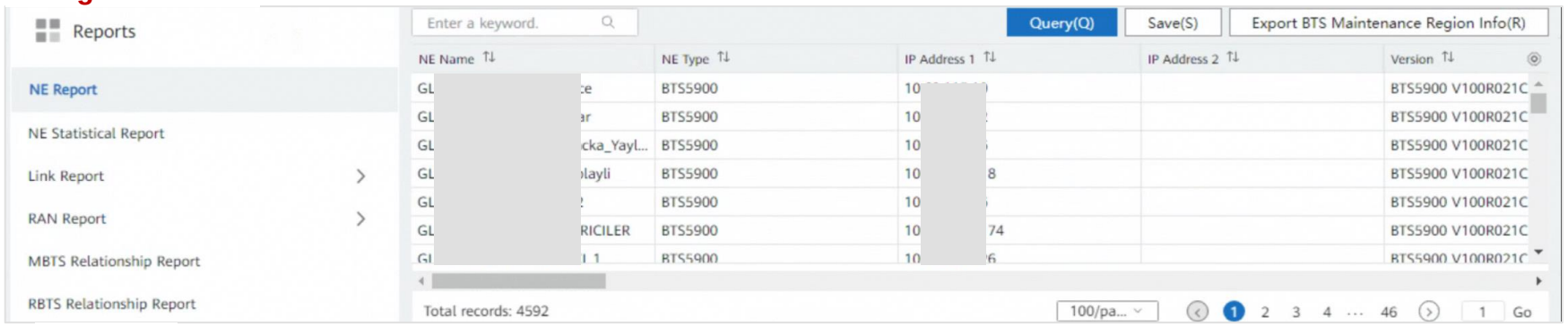
Evidence： Alarm data collection & correlation(performance, configuration)

KPI Alarm List

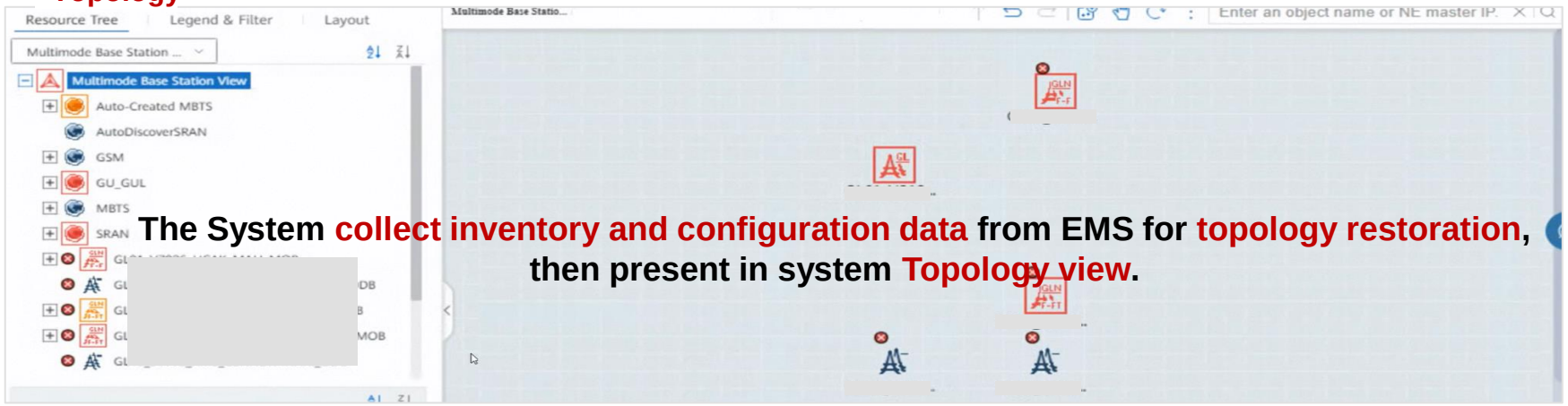


Operation	Severity	Alarm ID	Name	NE Type	Alarm ...	MO ...	Location Information
	Major	21820	GSM KPI Exceed Threshold	BSC6910 G...	BMDPH07	Subrack ...	Subrack No.=1, Slot No.=
	Major	21820	GSM KPI Exceed Threshold	BSC6910 G...	BSAMH04	Subrack ...	Subrack No.=1, Slot No.=
	Major	21820	GSM KPI Exceed Threshold	BSC6910 G...	BMDPH07	Subrack ...	Subrack No.=1, Slot No.=
	Major	22302	KPI Exceed Threshold	BSC6910 U...	RSAMH05	RSAMH...	Subsystem No.=2018, KI

Configuration Data



Topology

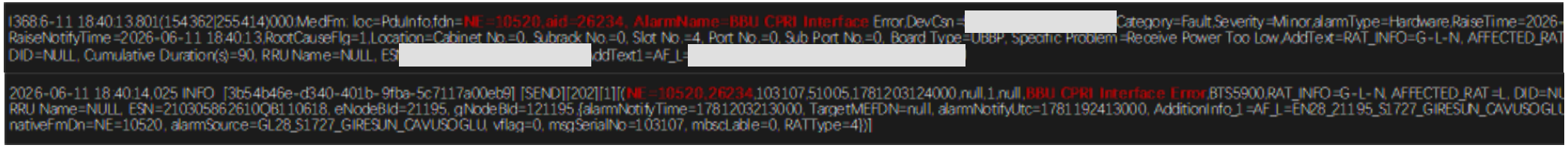


The System collect inventory and configuration data from EMS for topology restoration, then present in system Topology view.

Data collection & Alarm filtering

Evidence：

Alarm Data Automatically Collecting Logs



Alarms are reported from NE in real time Automatically

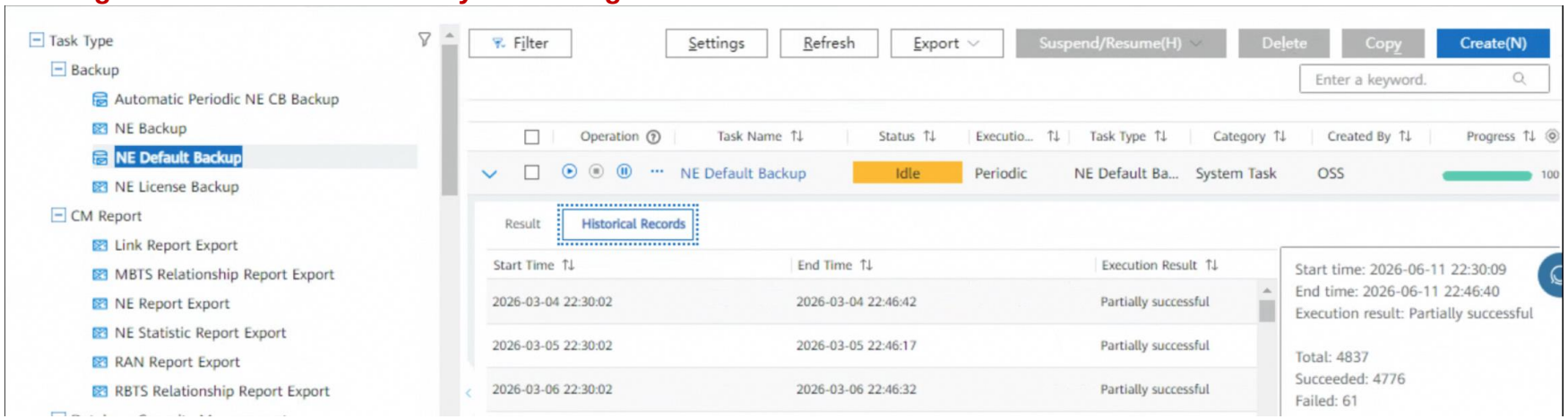
Alarms are received by MAE in real time Automatically

Performance Data Automatically Collecting Logs

```
I169:6-11 04:21:02.477(130588|135844)PmMed: NeReportNotify::pushRstFileReadyMsg[NE=1456|A20260611.0415+0300-0420+0300_EMS-SHORTPERIOD.mrf.bz2]
I169:6-11 04:26:02.383(130588|135838)PmMed: NeReportNotify::pushRstFileReadyMsg[NE=1456|A20260611.0420+0300-0425+0300_EMS-SHORTPERIOD.mrf.bz2]
I169:6-11 04:31:02.380(130588|135836)PmMed: NeReportNotify::pushRstFileReadyMsg[NE=1456|A20260611.0425+0300-0430+0300_EMS-SHORTPERIOD.mrf.bz2]
I169:6-11 04:31:13.332(130588|135839)PmMed: NeReportNotify::pushRstFileReadyMsg[NE=1456|A20260611.0400+0300-0430+0300_EMS-NORMAL.mrf.bz2]
I169:6-11 04:36:02.471(130588|135843)PmMed: NeReportNotify::pushRstFileReadyMsg[NE=1456|A20260611.0430+0300-0435+0300_EMS-SHORTPERIOD.mrf.bz2]
```

PM data are received by MAE in real time Automatically

Configuration Data Automatically Collecting Historical Records



Configuration data are update to MAE Automatically every day

Fault Prediction

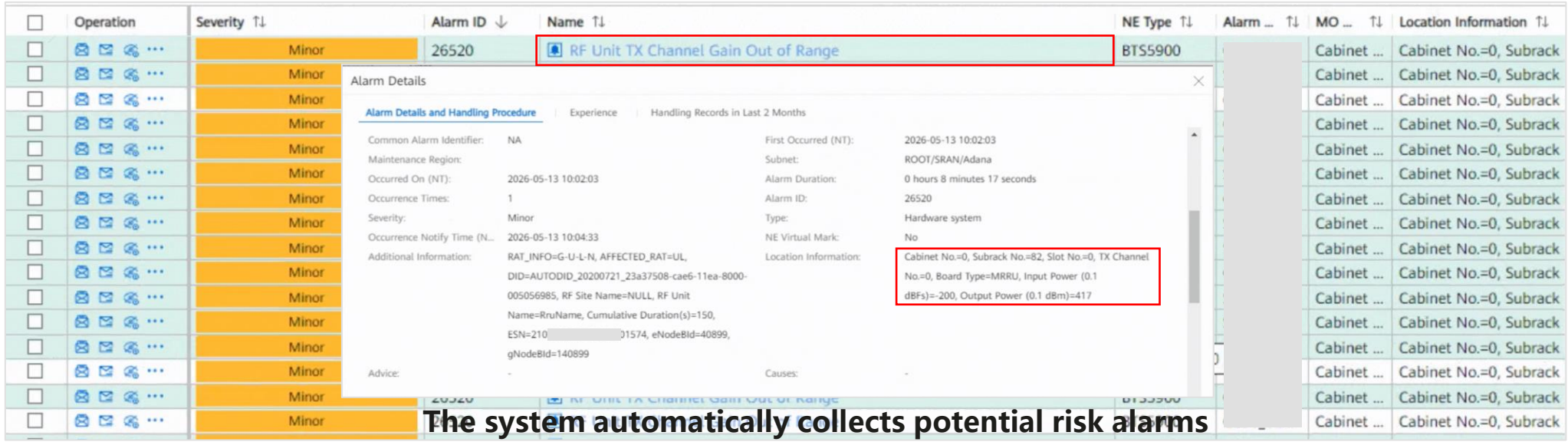
Service Capability	Weight	Question	Option A	√ Option B	√ Option C	Option D
Fault Prediction	15%	Does the wireless network fault management system support fault prediction in various fault scenarios?	The system identifies potential risks and predicts the fault occurrence time based on intelligent models without the need for human intervention.	The system identifies potential risks based on intelligent models, but cannot predict the fault occurrence time.	The system identifies potential risks based on manually defined rules. For example, the system can identify potential risks of fronthaul optical modules based on preset optical power thresholds.	Potential risks need to be manually identified based on expertise.

Equipment	Processing Error	Communications	Environmental	Security
C	B	C	B	B

Fault Prediction

Evidence：

Equipment - C

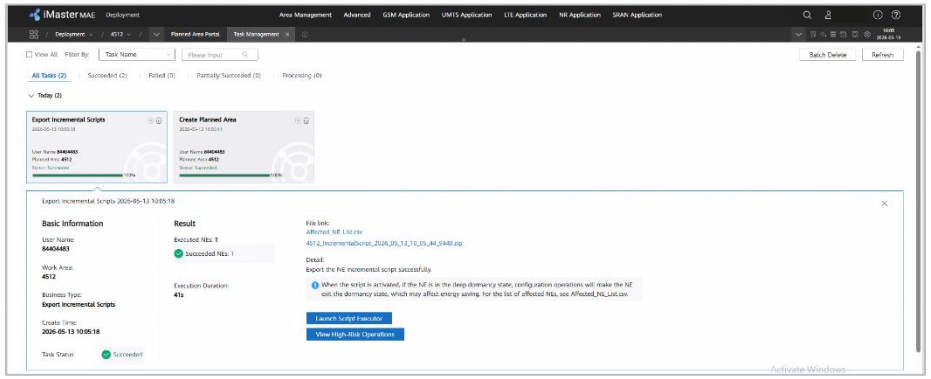


The system automatically collects potential risk alarms reported based on preset rules.

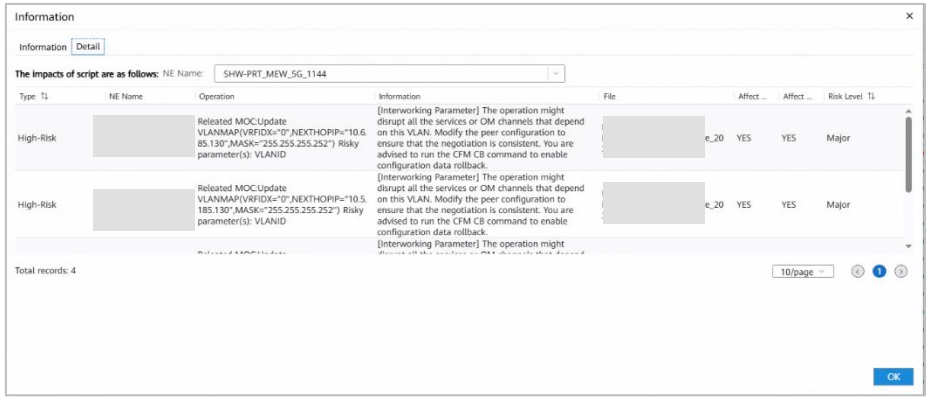
Fault Prediction

Evidence：

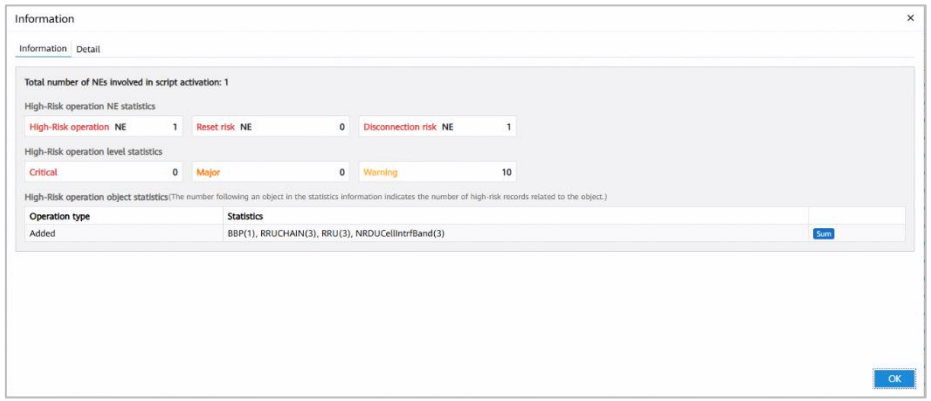
Processing Error - B



1. EMS can identify various high-risk information present in scripts



2. Click on Detail to view detailed information about high-risk alerts

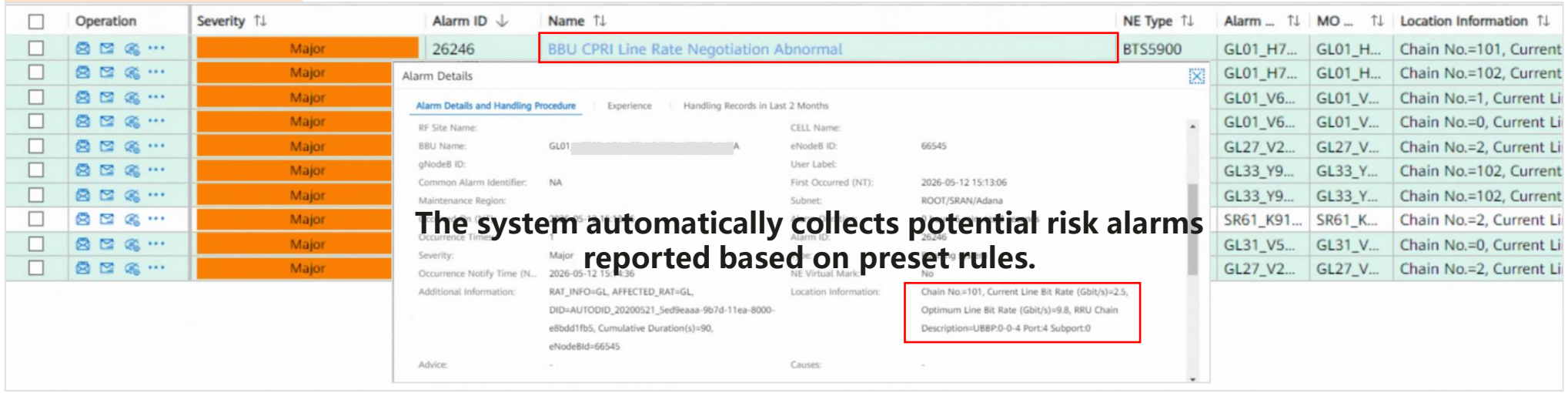


3. When the user triggers the script deployment, the script risk is prompted again, and the script can only be deployed after the user confirms.

Fault Prediction

Evidence：

Communications - C



The system automatically collects potential risk alarms reported based on preset rules.

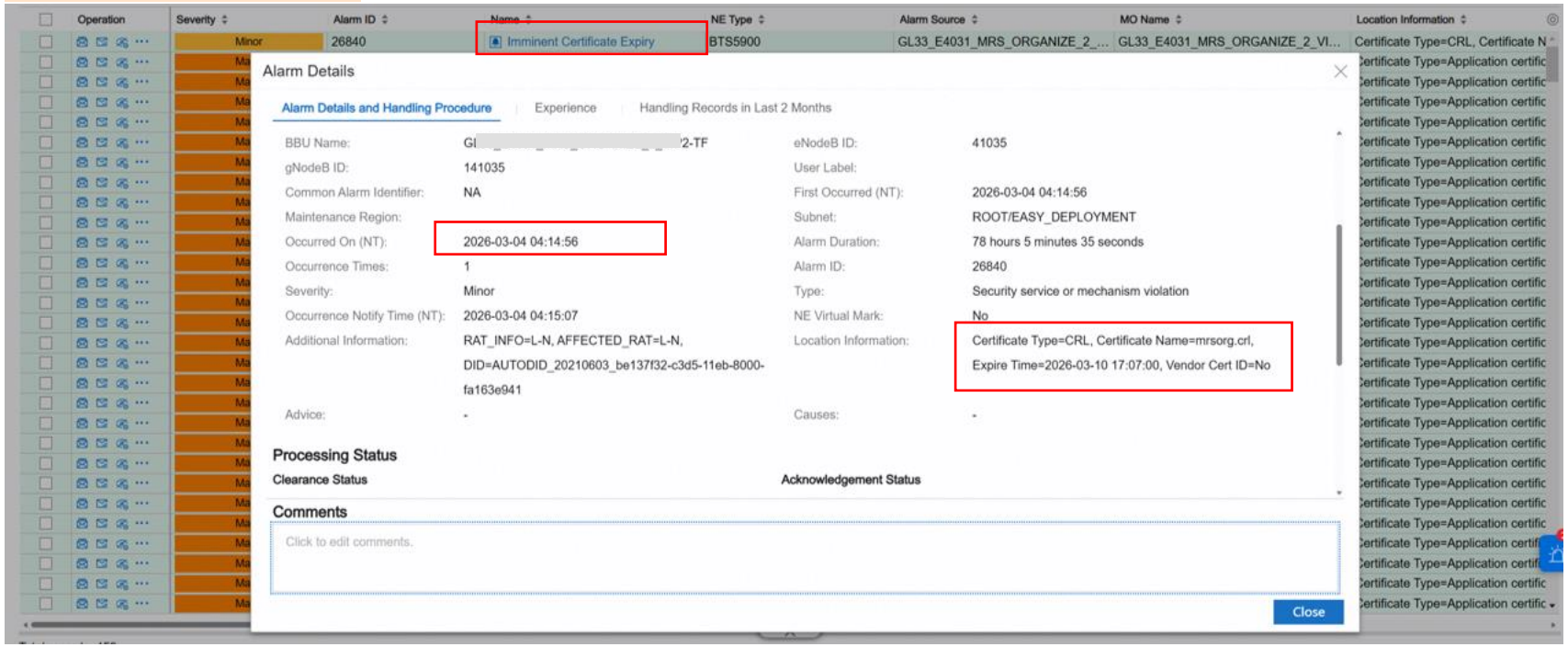
Environmental - B

The system automatically analyzes the average temperature trend, the number of high and low temperature sites, and predicts future data to identify potential risks.

Fault Prediction

Evidence：

Security - B



MAE can automatically identify certificate expiration dates and provide notifications 6 days in advance. Based on this type of security certificate prediction.

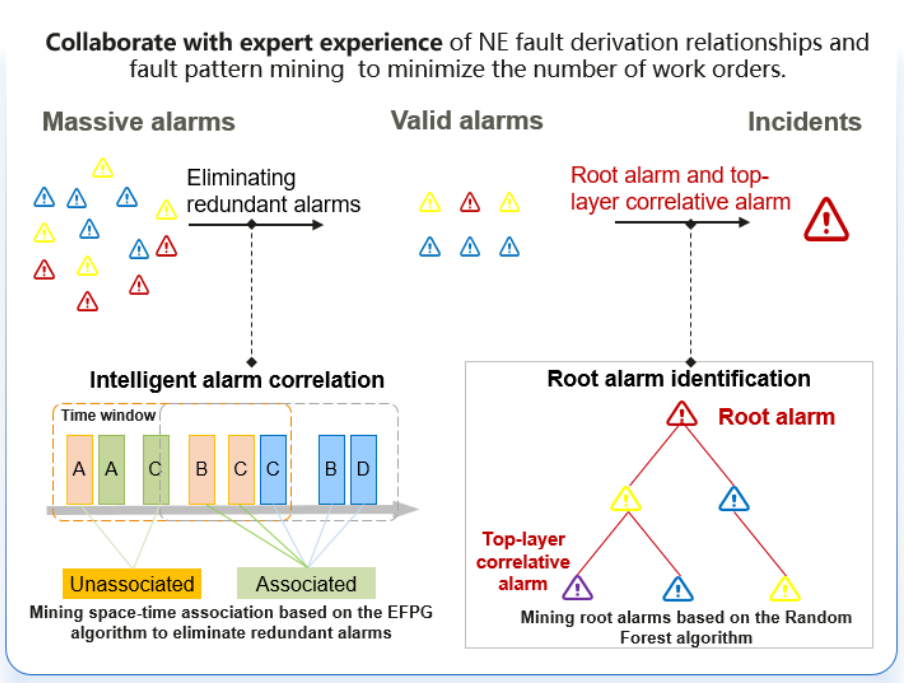
Fault identification & Impact analysis

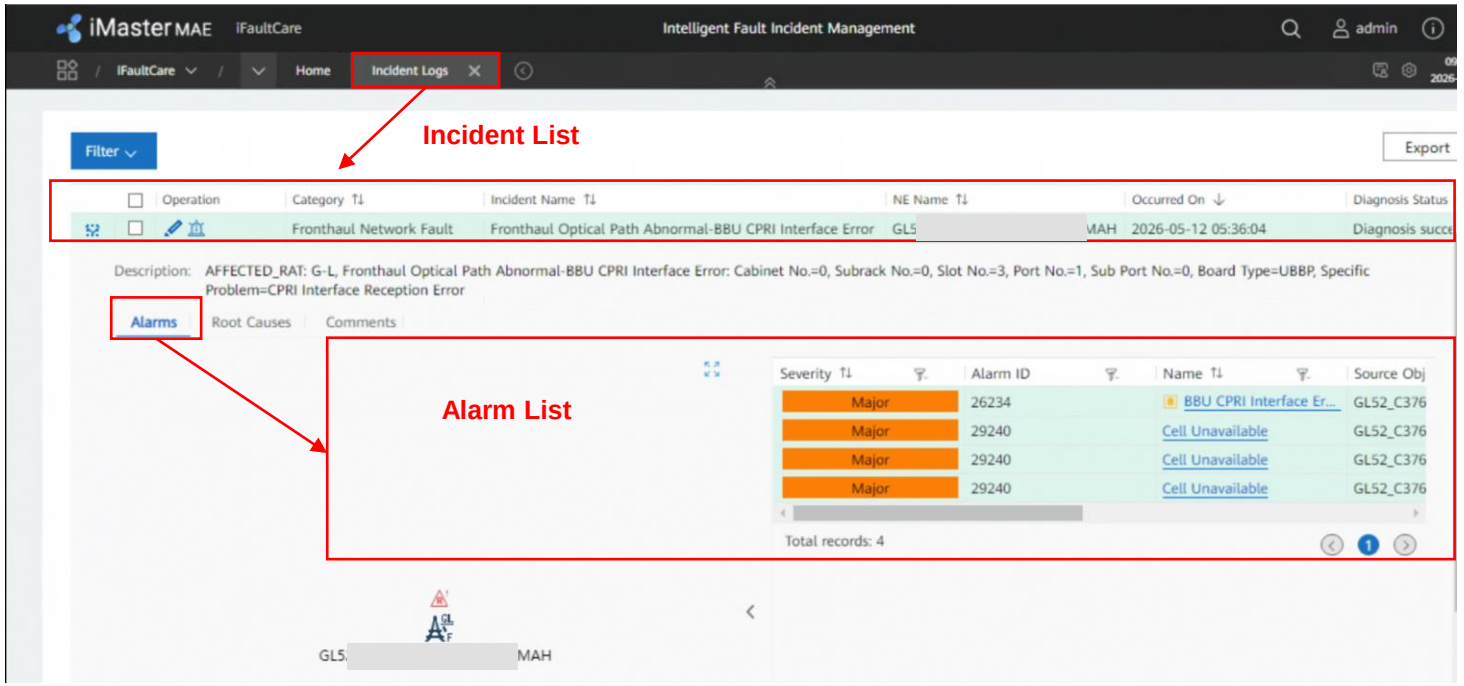
Service Capability	Weight	Question	√ Option A	√ Option B	Option C	Option D
Demarcation & Locating	20%	How does the wireless network fault management system support fault identification & fault impact analysis in various fault scenarios?	The system identifies faults and subsequent impact based on intelligent models without the need for human intervention.	The system identifies faults and subsequent impact based on intelligent models,but need human intervention.	The System identifies faults and subsequent impact based on manually defined rules, for example, identifying intermittent faults based on a frequency experience threshold and aggregating periodic alarms based on a period threshold.	Faults and impact need to be manually identified based on human expertise or through the execution of manual written procedures.

Equipment	Processing Error	Communications	Environmental	Security
A	A	A	A	A

Fault identification & Impact analysis

Evidence： Fault identification





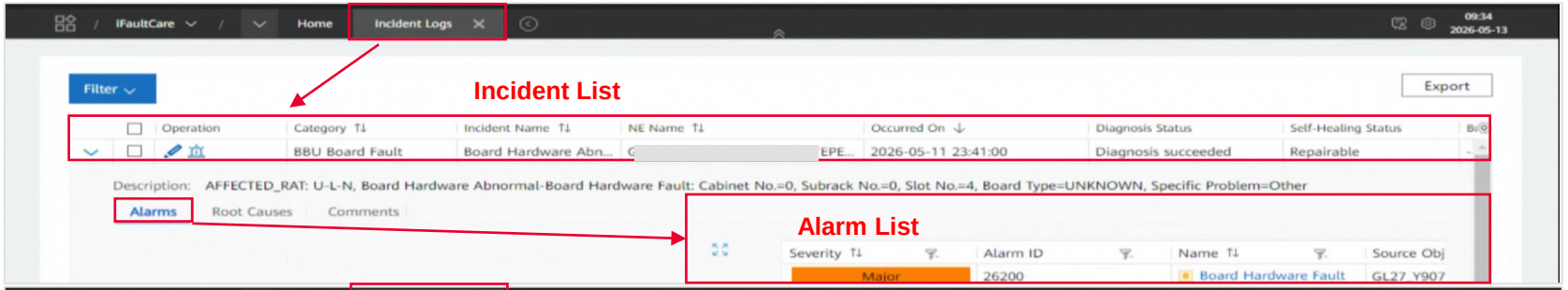
MAE use intelligent model mining to extract alarm correlation rules for faults, enabling real-time alarms to be automatically aggregated and identified as fault events based on these rules.

Fault identification & Impact analysis

Evidence： Fault identification

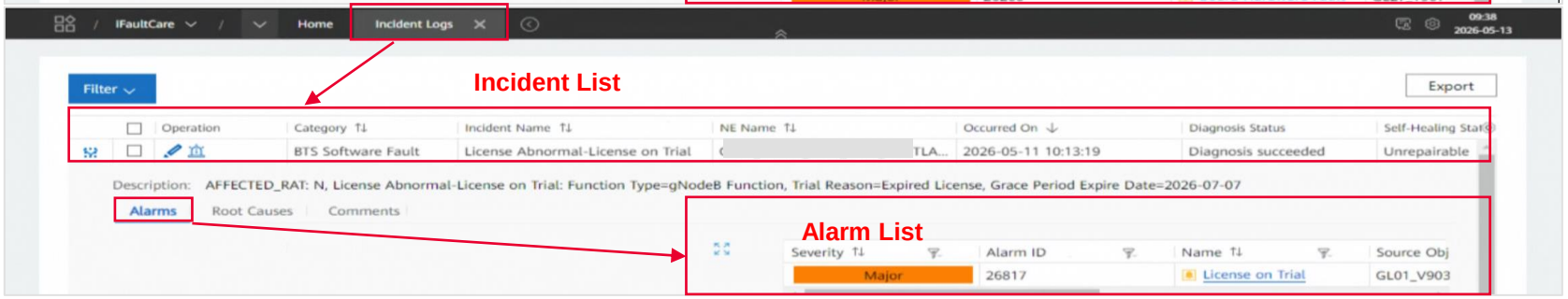
Equipment - A

The system identifies hardware faults based on intelligent models without the need for human intervention.



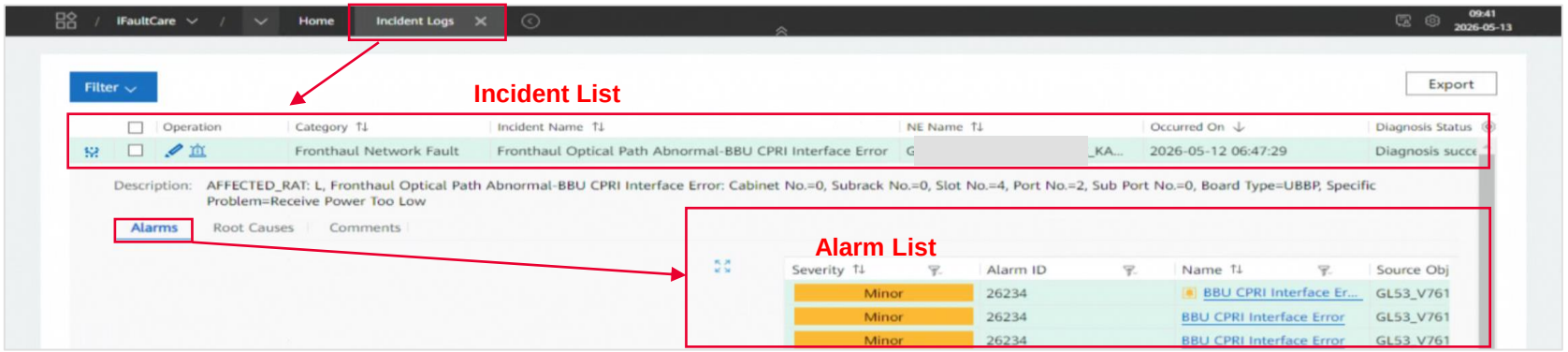
Processing Error - A

The system identifies license on trail faults based on intelligent models without the need for human intervention.



Communications - A

The system identifies fronthaul faults based on intelligent models without the need for human intervention.

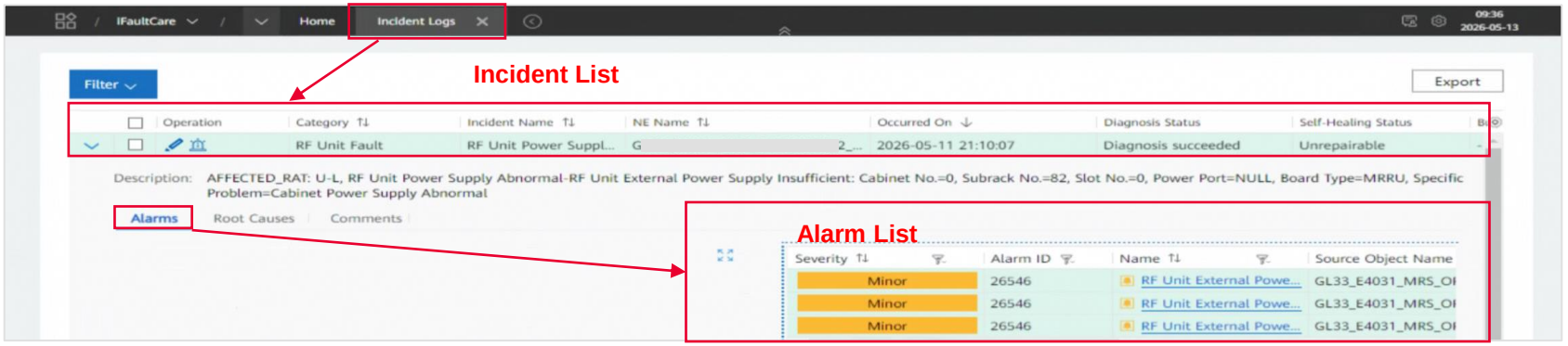


Fault identification & Impact analysis

Evidence： Fault identification

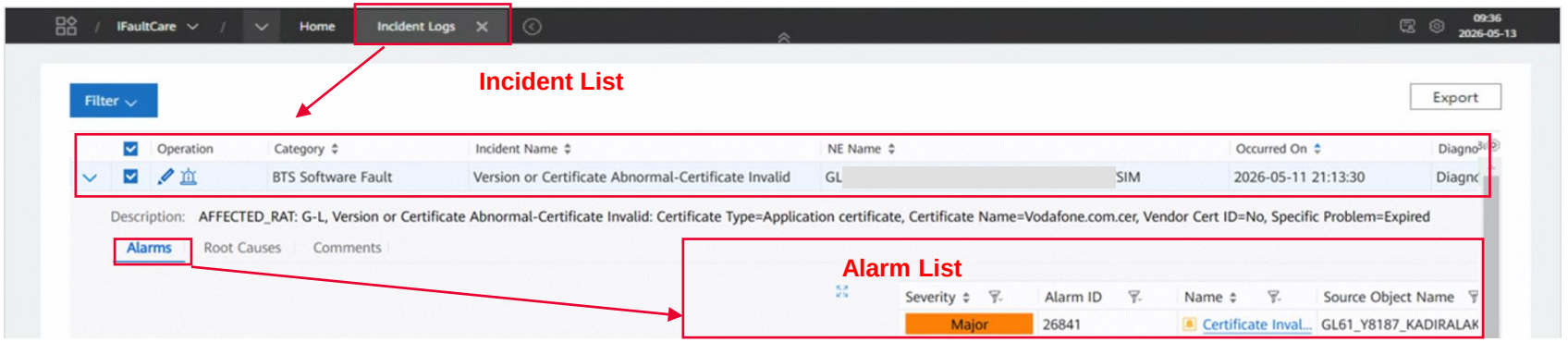
Environmental - A

The system identifies power faults based on intelligent models without the need for human intervention.

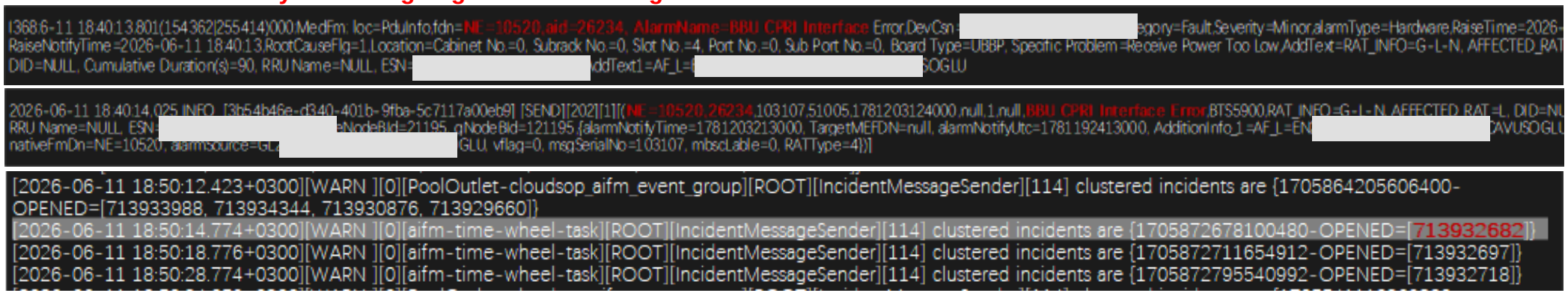


Security - A

The system identifies certificate invalid faults based on intelligent models without the need for human intervention.



Alarm Data Automatically Collecting Logs and Correlating to fault incident



Alarms are reported from NE in real time Automatically

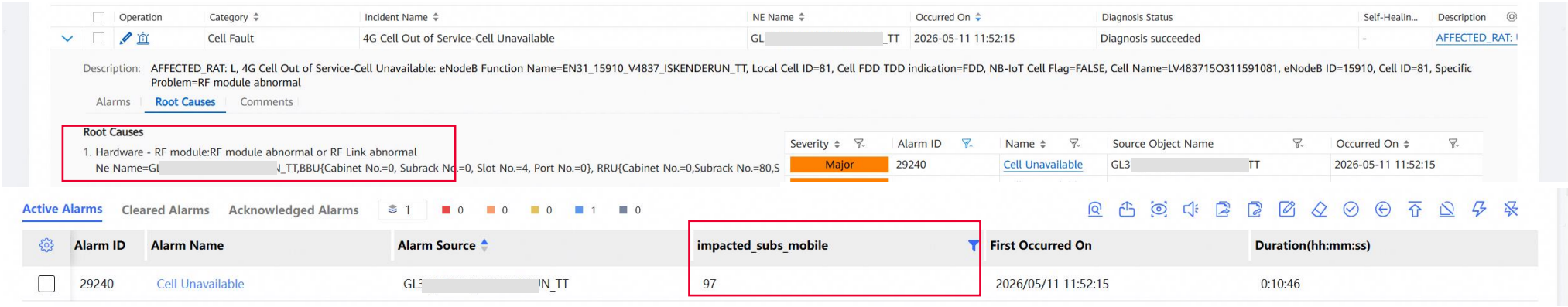
Alarms are received by MAE in real time Automatically

Automatic incident aggregation in real time

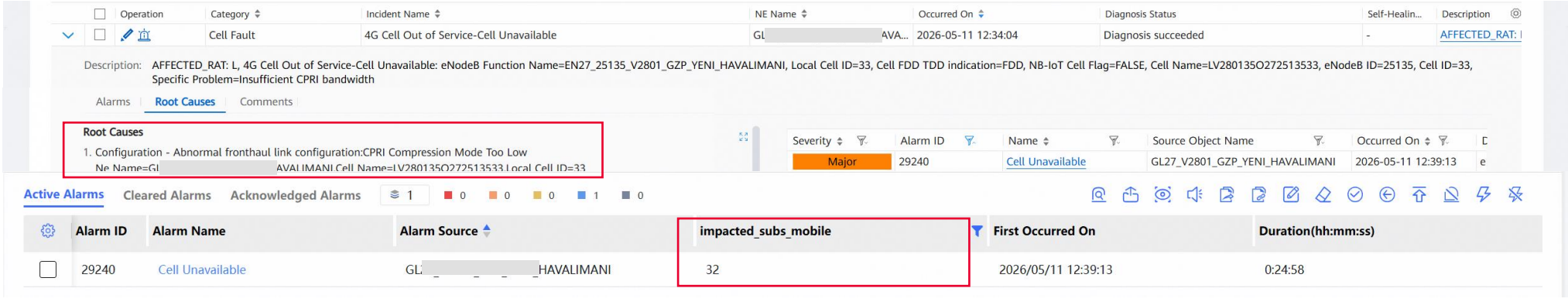
Fault identification & Impact analysis

Evidence： Service impact analysis

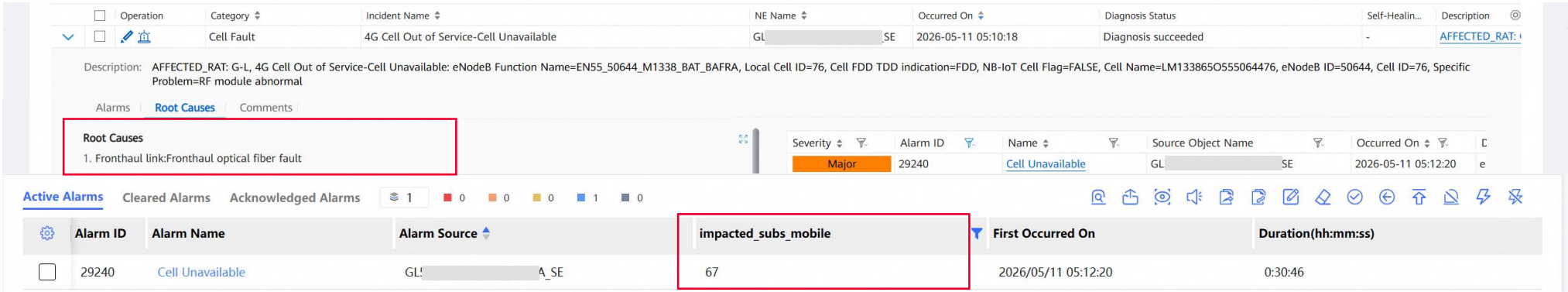
Equipment - A



Processing Error - A



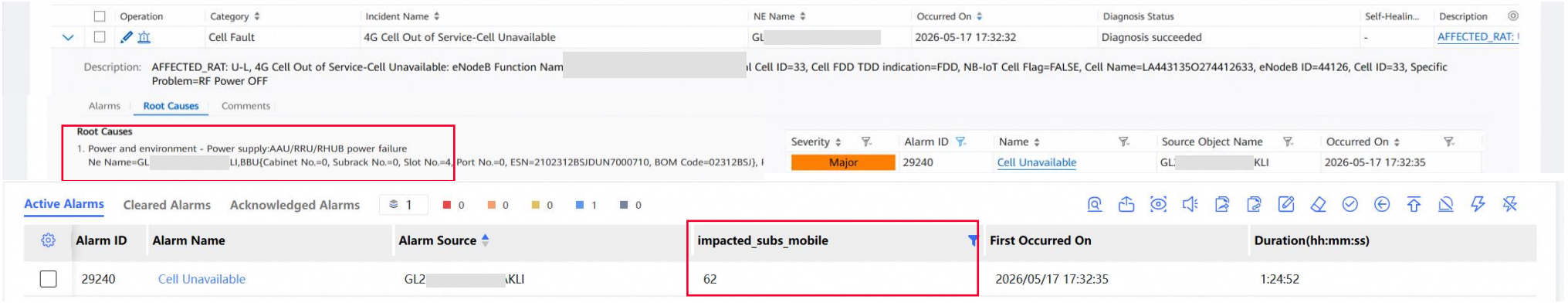
Communications - A



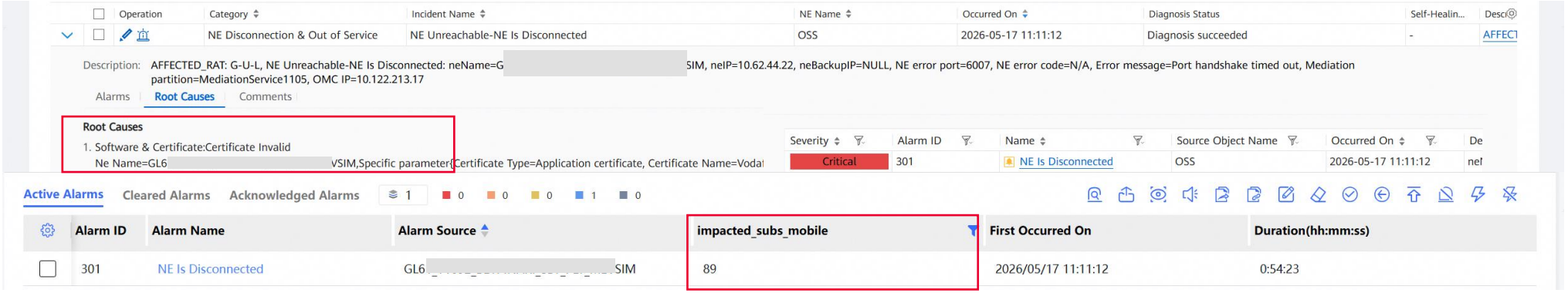
Fault identification & Impact analysis

Evidence： Service impact analysis

Environmental - A

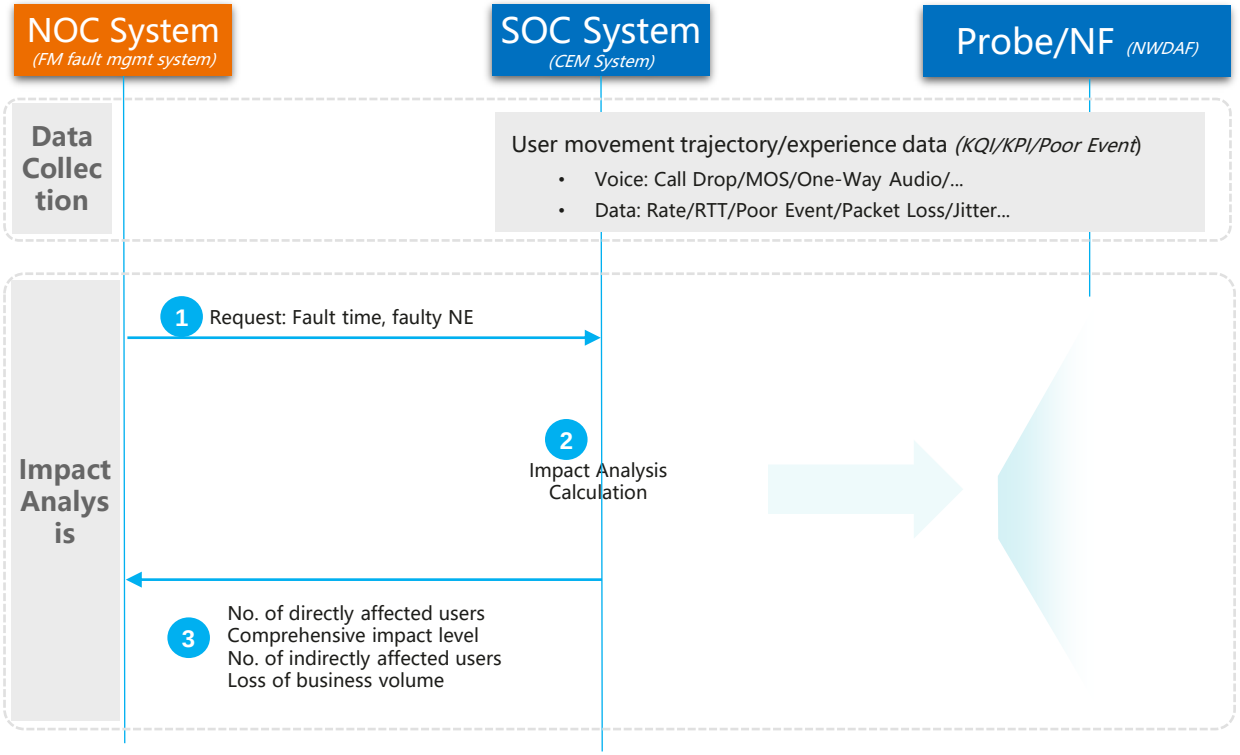


Security - A



Fault identification & Impact analysis

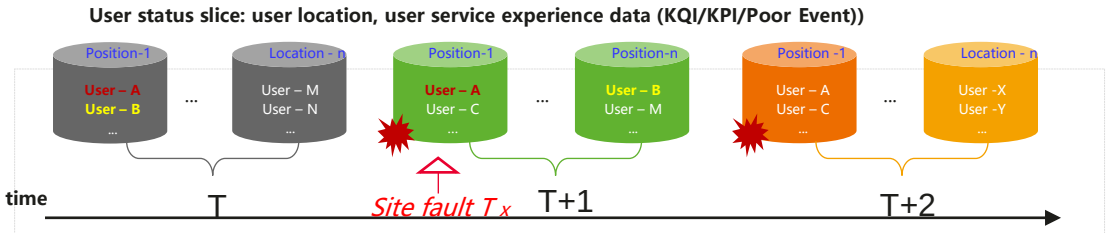
Interaction Process



■ Service Process

- **Task Reporting:** The NOC reports network element fault alarms to the SOC.
- **Task Initiation:** The SOC initiates calculations, updates the task status, and performs compensation calculations for tasks with abnormal computations.
- **Result Reporting:** The SOC proactively reports the calculation results to the NOC. The reported information includes: comprehensive impact level, number of affected users, predicted loss of business volume, and a list of indicators for the user network element before and after the fault.

Remarks: For alarms reported by NOC, task management will be conducted to achieve on-demand computing, ensure that the same alarm is only computed once, and perform supplementary retries in the event of a computing/reporting failure.



1 Identification of directly affected users

- **Input:** fault time, faulty NE, and user location slice
- **Processing:**

① Based on the user location track, user experience data, and slice period T, generate user status slice data (pre-calculated) or obtain the original data based on the fault time or faulty NE. The service call or Internet access logs are shifted forward or backward by period T to obtain all users and service experience before and after the NE fault occurs. (on-demand calculation)

② If the pre-calculation mode is used, the user status slice closest to the fault time needs to be searched forward based on the fault time/NE to obtain all users and service experience before the fault occurs.

③ If the pre-calculation mode is used, the user status slice closest to the fault time needs to be searched backward based on the fault time/NE to obtain all users after the fault occurs.

④ If a user is served by the faulty NE both before and after the fault occurs, the user is considered as a user who is not switched and is marked as a directly affected user.

⑤ For users whose locations are switched before & after the fault occurs, the service experience changes before & after are calculated. If the absolute and relative thresholds are met, the users are considered as directly affected users.

- **Output:** number of directly affected users and list of directly affected users (switched users + not switched users)

2 Identification of indirectly affected users

- **Input:** Fault time, faulty NE, user location slice, switched users
- **Processing:**

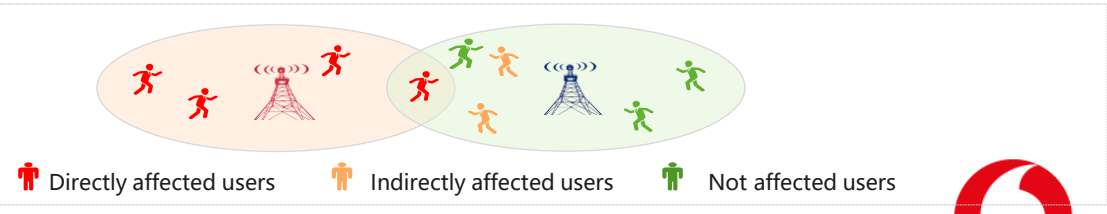
① Obtain the original users under the target NE that switched user;

② For the original users, calculate the changes in service experience before & after the fault. When the absolute and relative thresholds are met, they are determined as indirectly affected users

- **Output:** Number of indirectly affected users, list of indirectly affected users;

3 Analysis of business volume loss

- **Input:** Fault time, faulty NE, directly affected users, indirectly affected users
- **Processing:** Based on directly affected users, the historical year-on-year/period-on-period traffic model is used to obtain the business volume (data traffic + voice traffic) loss.
- **Output:** Data traffic, voice traffic



Demarcation & Locating

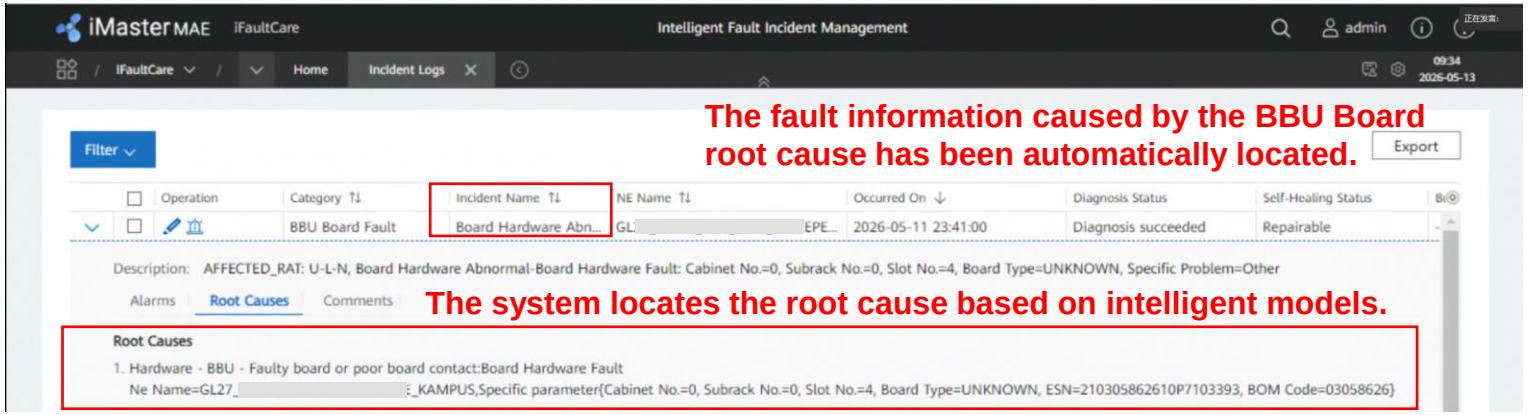
Service Capability	Weight	Question	√ Option A	√ Option B	Option C	Option D
Demarcation & Locating	20%	Does the wireless network fault management system support root cause diagnosis and fault locating in various fault scenarios? Note: The root cause diagnosis and fault locating should require the ability to locate smallest field replaceable unit, upgradable software modules and connectors so that a repair solution can be quickly determined. e.g, Optical module, fiber optic cable and optical connectors.	The system demarcates and locates faults based on intelligent models without the need for human intervention.	The system demarcates the fault or locates multiple causes based on intelligent models, but the human intervention is required.	The system demarcates and locates faults based on manually defined rules (such as experience-based fault trees and troubleshooting processes) and needs human intervention.	Fault diagnosis needs to be manually performed based on expertise.

Equipment	Processing Error	Communications	Environmental	Security
A	A	B	A	A

Demarcation & Locating

Evidence:

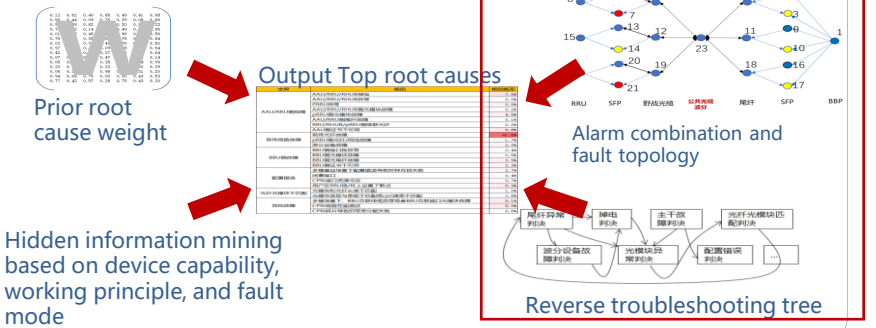
Equipment - A



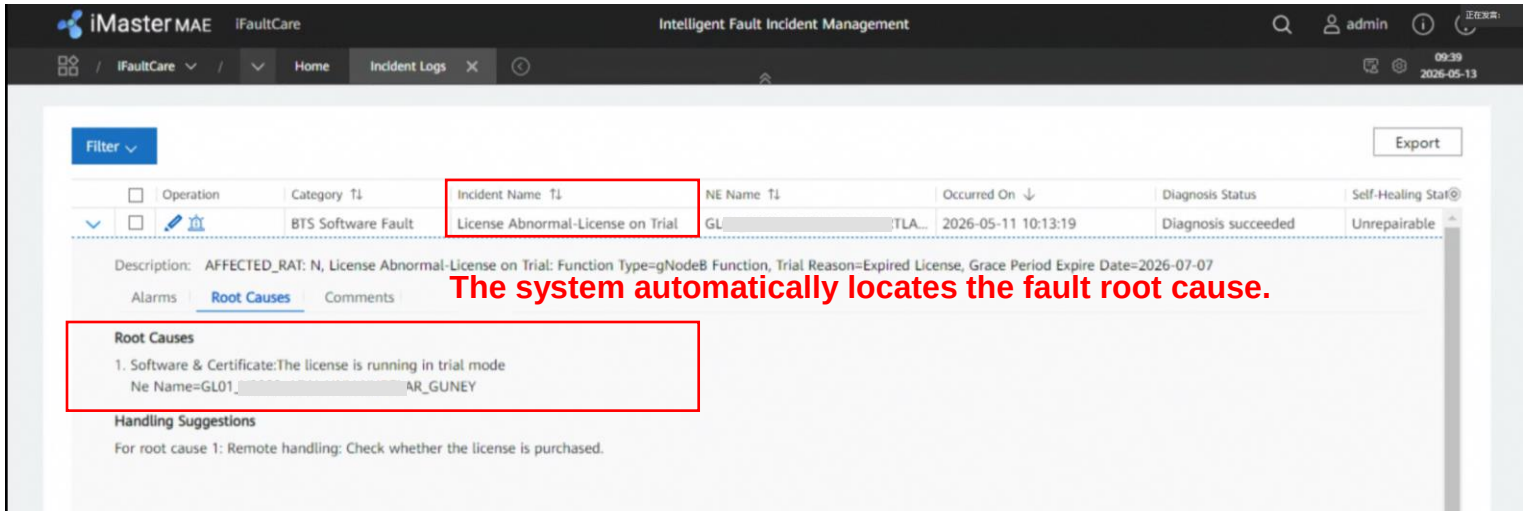
The fault information caused by the BBU Board root cause has been automatically located.

The system locates the root cause based on intelligent models.

Probability fusion decision

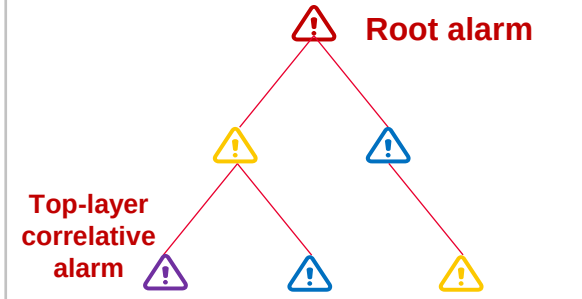


Processing Error - A



The system automatically locates the fault root cause.

Root alarm identification



✓ Perform causal analysis based on the associated alarms reported for the fault to determine the root cause.

Demarcation & Locating

Evidence:

Communications - B

Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status	Self-I
	Cell Fault	4G Cell Out of Service-Cell Unavailable	GL5 _SE	2026-05-10 21:39:57	Diagnosis succeeded	-

Description: AFFECTED_RAT: G-L, 4G Cell Out of Service-Cell Unavailable: eNodeB Function Name=EN , Local Cell ID=76, Cell FDD TDD indication=FDD, NB-IoT Cell Flag=FALSE, Cell Name=LM133865O555064476, eNodeB ID=50644, Cell ID=76, Specific Problem=RF module abnormal

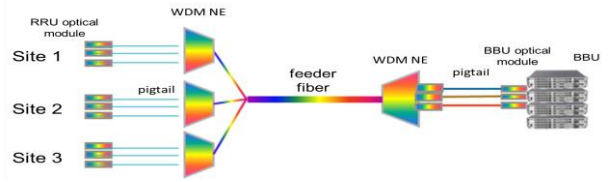
Alarms | Root Causes | Comments

The system demarcates root cause based on intelligent models.

Root Causes

1. Fronthaul link:Fronthaul optical fiber fault
   Ne Name=GL RA_SE,BBU{Cabinet No.=0, Subrack No.=0, Slot No.=2, Port No.=4, ESN=02 2219, BOM Code=03022HEJ}

Fronthaul topology restoration

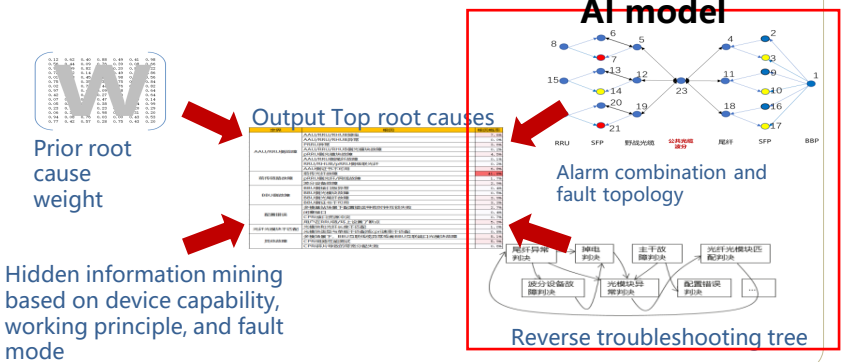


Construct the connection relationship between RRU and BBU ports based on the configuration

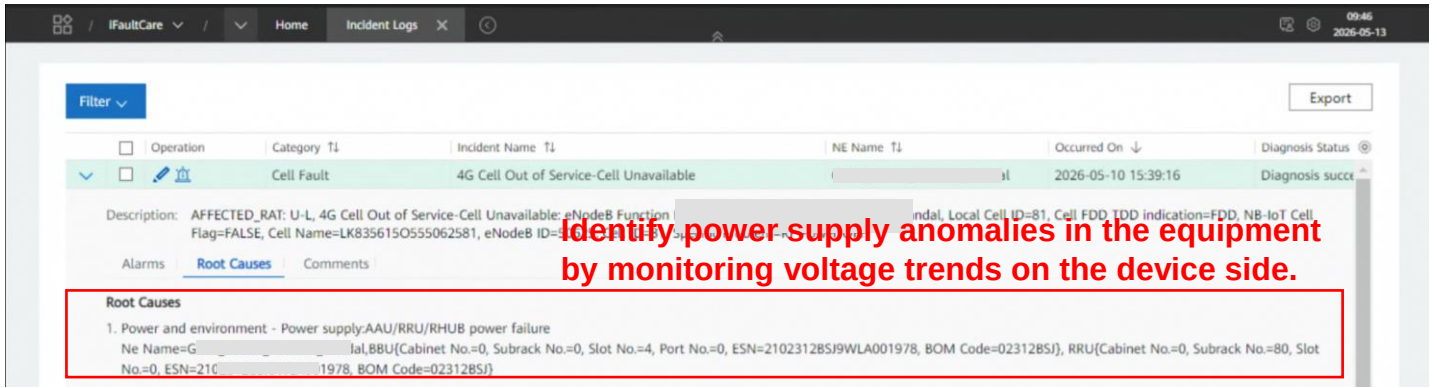
Restore the WDM device grouping based on the wavelength information of the optical module

Construct the RRU site grouping relationship based on the neighbor relationship and fiber length

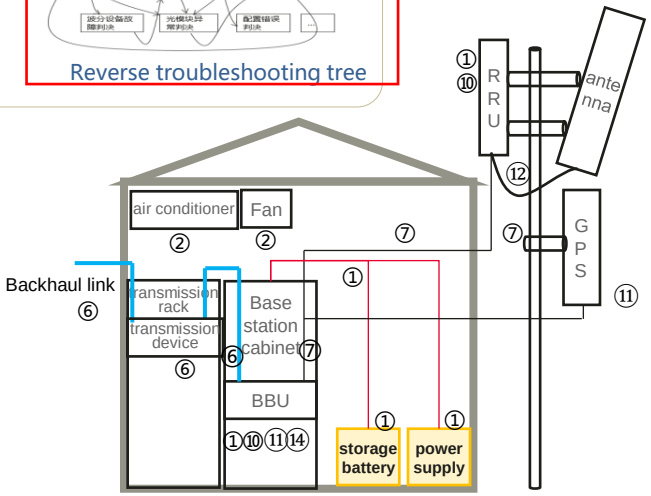
Probability fusion decision



Environmental - A



Identify power supply anomalies in the equipment by monitoring voltage trends on the device side.

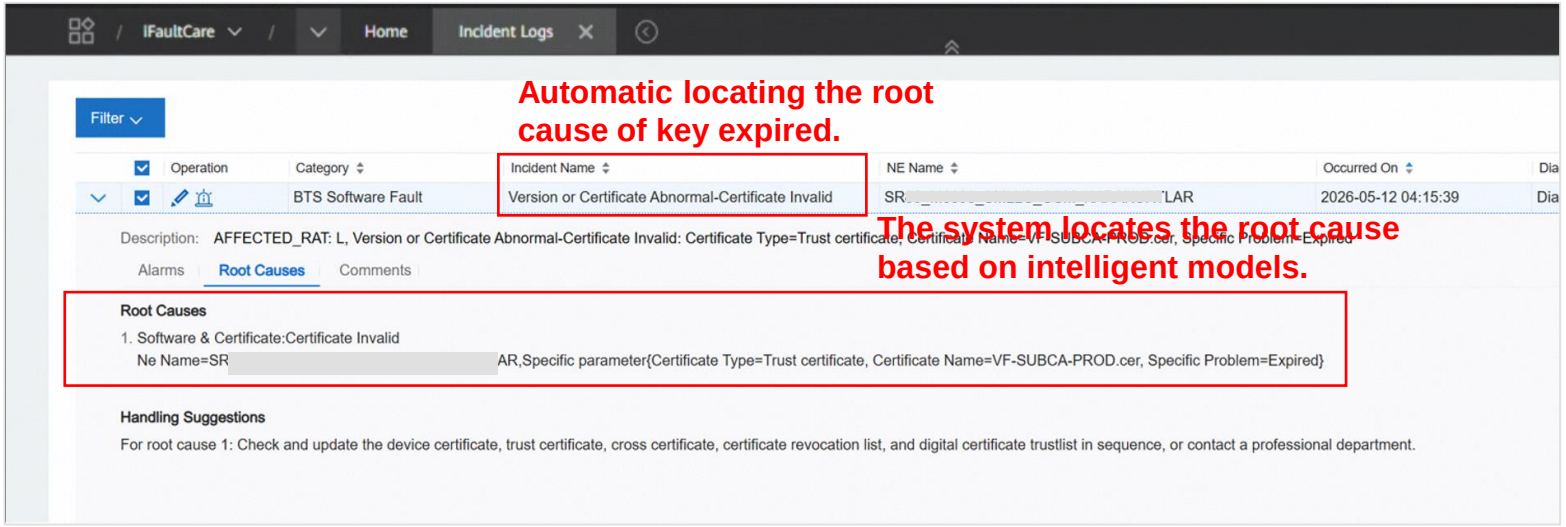


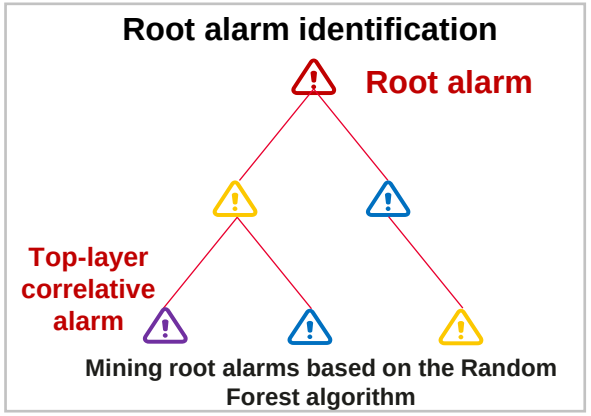
✓ The BBU monitors the change of the backup power voltage.

Demarcation & Locating

Evidence：

Security - A





✓ Perform causal analysis based on the associated alarms reported for the fault to determine the root cause.

Solution generation

Service Capability	Weight	Question	√ Option A	Option B	Option C	Option D
Solution generation	10%	Does the wireless network fault management system support generation of fault recovery solutions in various scenarios?	The system generates one or multiple possible fault recovery or fault rectification solutions based on intelligent model without the need for human intervention.	The system generates multiple possible fault recovery or rectification solutions based on intelligent model, but need human intervention.	The system generates one or multiple possible fault recovery or rectification solutions based on manually defined rules and need human intervention.	Fault recovery or rectification solutions needs to be manually generated based on expertise.

Evaluation and decision-making

Service Capability	Weight	Question	Option A	Option B	Option C	Option D
Evaluation and decision-making	10%	Does the wireless network fault management system support evaluation and decision-making in various scenarios?	The system evaluates multiple possible recovery or rectification solutions and determines the optimal recovery or fault rectification solution based on intelligent models without the need for human intervention.	The system evaluates multiple possible recovery or rectification solutions and determines the optimal recovery or fault rectification solution based on intelligent models, but need human intervention.	The system evaluate and decide the fault recovery or fault rectification solution based on manually defined rules and need human intervention.	The fault recovery or fault rectification solution is manually evaluated and decided.

Equipment	Processing Error	Communications	Environmental	Security
A	A	A	A	A

Solution generation & Evaluation and decision-making

Evidence：

Equipment - A

Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status	Self-Healing Status
	BBU Board Fault	Board Hardware Abn...		2026-05-11 23:41:00	Diagnosis succeeded	Repairable

Description: AFFECTED_RAT: U-L-N, Board Hardware Abnormal-Board Hardware Fault: Cabinet No.=0, Subrack No.=0, Slot No.=4, Board Type=UNKNOWN, Specific Problem=Other

Alarms | Root Causes | Comments

Based on fault diagnosis and intelligent analysis, select the optimal one-time on-site solution.

Root Causes

1. Hardware - BBU - Faulty board or poor board contact:Board Hardware Fault
   Ne Name=GL2 MPUS,Specific parameter{Cabinet No.=0, Subrack No.=0, Slot No.=4, Board Type=UNKNOWN, ESN=210305862610P7103393, BOM Code=03058626}

Handling Suggestions

For root cause 1: 1. Remotely reset the device. If the fault persists, replace the device.
Reference MML Command for Self-Healing:
MML: RST BRD:CN=0, SRN=0, SN=4;
Impact: Resetting a board will interrupt the services carried on the board and reinitialize the board. Before the initialization is complete, the board is unavailable.
Recovery duration: 1800s.

Generate and evaluate the optimal solution.

Processing Error - A

Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status	Self-Healing S
	BTS Software Fault	License Abnormal-License on Trial		2026-05-11 10:13:19	Diagnosis succeeded	Unrepairable

Description: AFFECTED_RAT: N, License Abnormal-License on Trial: Function Type=gNodeB Function, Trial Reason=Expired License, Grace Period Expire Date=2026-07-07

Alarms | Root Causes | Comments

Based on fault diagnosis and intelligent analysis, select the optimal one-time solution.

Root Causes

1. Software & Certificate:The license is running in trial mode
   Ne Name=G GUNEY

Handling Suggestions

For root cause 1: Remote handling: Check whether the license is purchased.

Generate and evaluate the optimal solution.

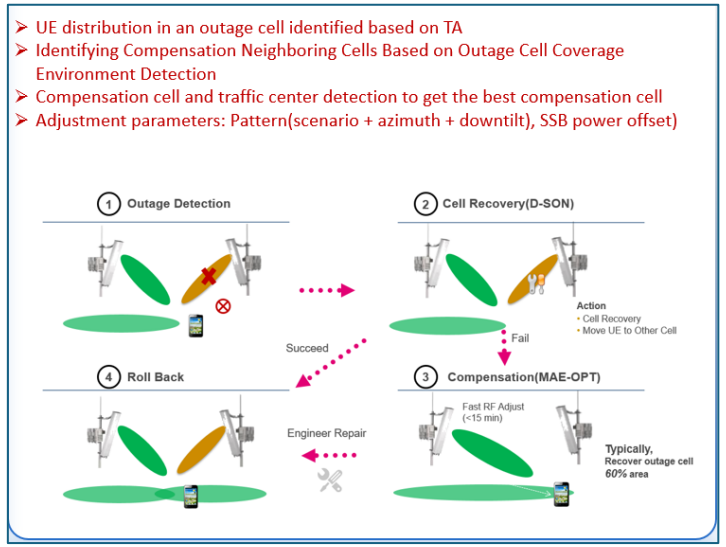
Solution generation & Evaluation and decision-making

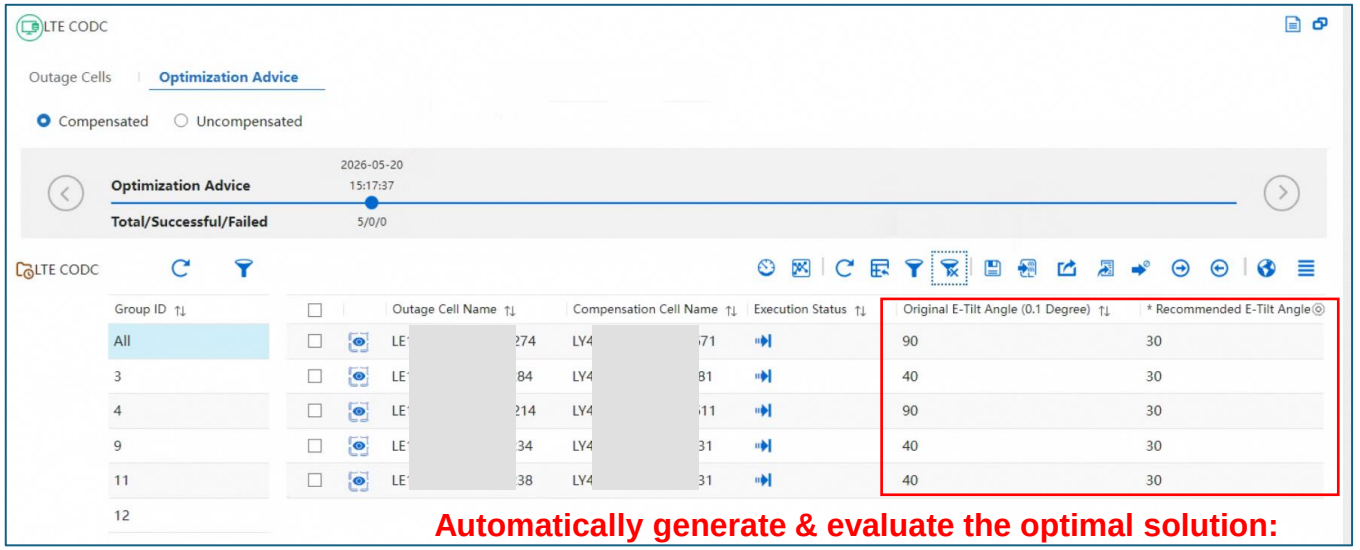
Evidence：

Communications - A

Environmental - A

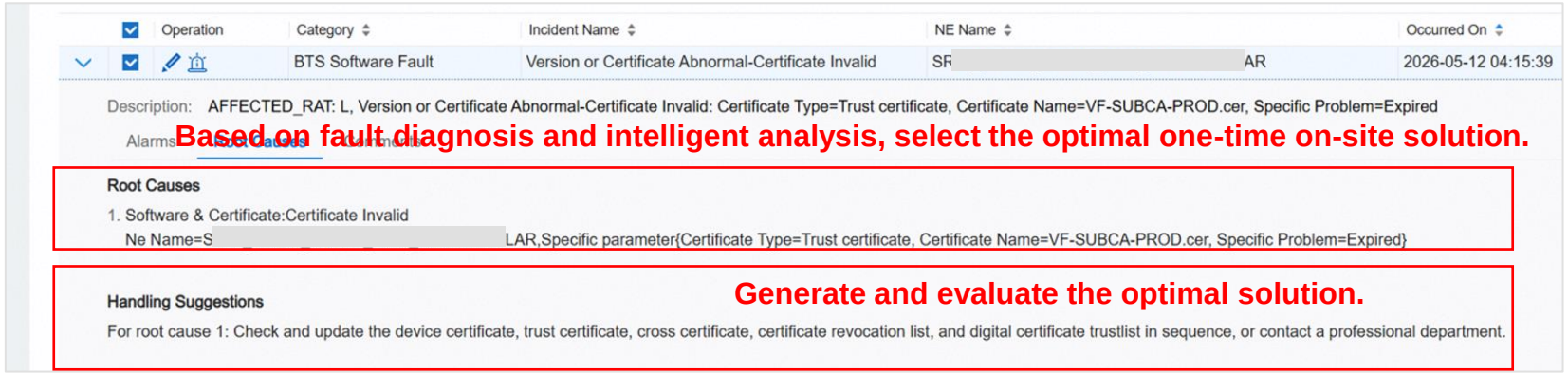
Example : Cell Outage Detection and Compensation (CODC) – based on Cell Unavailable





Automatically generate & evaluate the optimal solution: compensation for out-of-service cell by adjusting the electrical tilt angle

Security - A

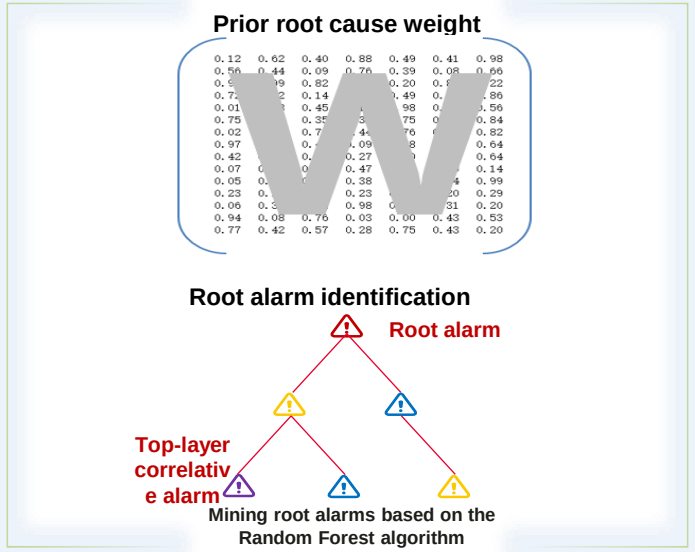


Based on fault diagnosis and intelligent analysis, select the optimal one-time on-site solution.

Generate and evaluate the optimal solution.

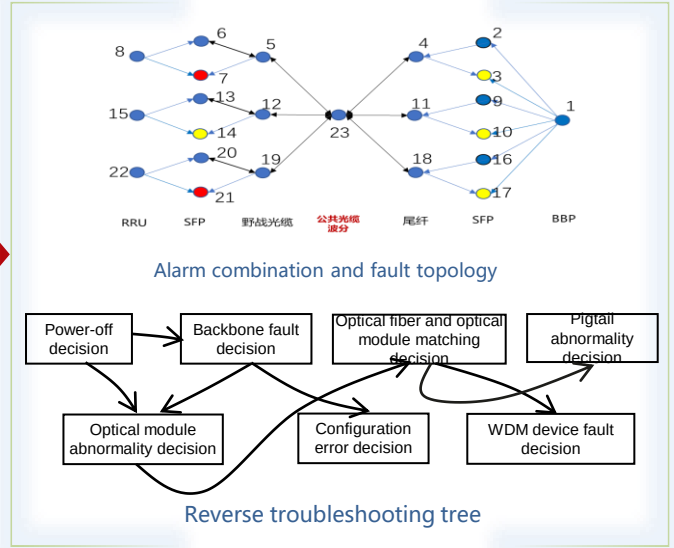
Demarcation & Locating, Solution generation & Evaluation and decision-making

Multi-dimensional input data source



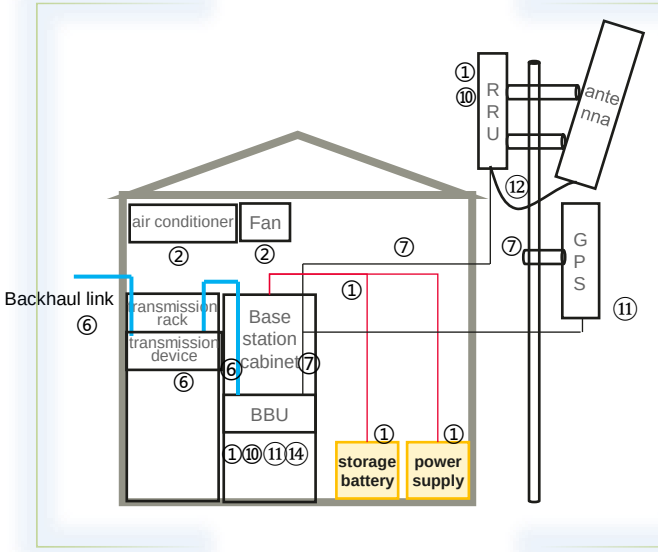
AI model

Root Cause Diagnosis Driven by Knowledge Graph and Data Collaboration



Top N root causes and solutions

14 categories, 200+ root causes and handling suggestions



① Incident diagnosis begins

Note: The demarcation & locating, solution generation & evaluation, and decision-making are performed using the overall algorithm. Therefore, this page provides a unified description.

Demarcation & Locating, Solution generation & Evaluation and decision-making

1. **Algorithms:** Root Cause Diagnosis Driven by Knowledge Graph and Data Collaboration
1) Involved algorithms: Knowledge Graph and Graph Neural Network combined with GCN-RCA. Key sub-technologies: Knowledge Graph (KG), Graph Neural Network (GCN).
2) Reasons for this choice:
1. Why choose [Graph Neural Network (GNN)]?
Fault propagation often follows network topology or dependency relationships (e.g., base station -> transmission network -> core network). GNNs (such as GCN, GAT, GraphSAGE) can effectively aggregate information from neighboring nodes and capture global dependencies, which traditional machine learning methods (e.g., XGBoost) cannot achieve.
Advantages: Can handle non-Euclidean data (i.e., irregular graph structures) and directly utilize entities and relationship edges in the knowledge graph.

2. Why introduce [Knowledge Graph (KG)] instead of purely data-driven methods?
Interpretability: Pure data models are black boxes and cannot easily explain to O&M personnel "why" a particular device has failed. KG provides clear causal paths (A leads to B, B leads to C), making it easier for manual verification and trust.
Prior knowledge injection: KG includes expert experience, device dependencies, and historical cases. When data is sparse or new devices are introduced (cold start), KG can provide necessary structural constraints to prevent the model from overfitting to noisy data.
Generalization capability: By matching similar subgraphs in the graph, known fault patterns can be transferred to similar new scenarios.

3. Why emphasize [data collaboration] (multi-modal/time-series data fusion)?
Reason: To compensate for the static nature of KG and improve real-time diagnostic accuracy.
KG is typically static or updates slowly, while there is a large amount of dynamic metrics at the fault site (e.g., CPU utilization, packet loss rate, alarm logs).
Collaboration mechanism: Time-series data is transformed into node features (Node Embedding) and then integrated with the structural information of the KG, preserving the topological logic while incorporating real-time state changes.

Note: The demarcation & locating, solution generation & evaluation, and decision-making are performed using the overall algorithm. Therefore, this page provides a unified description.

Solution implementation

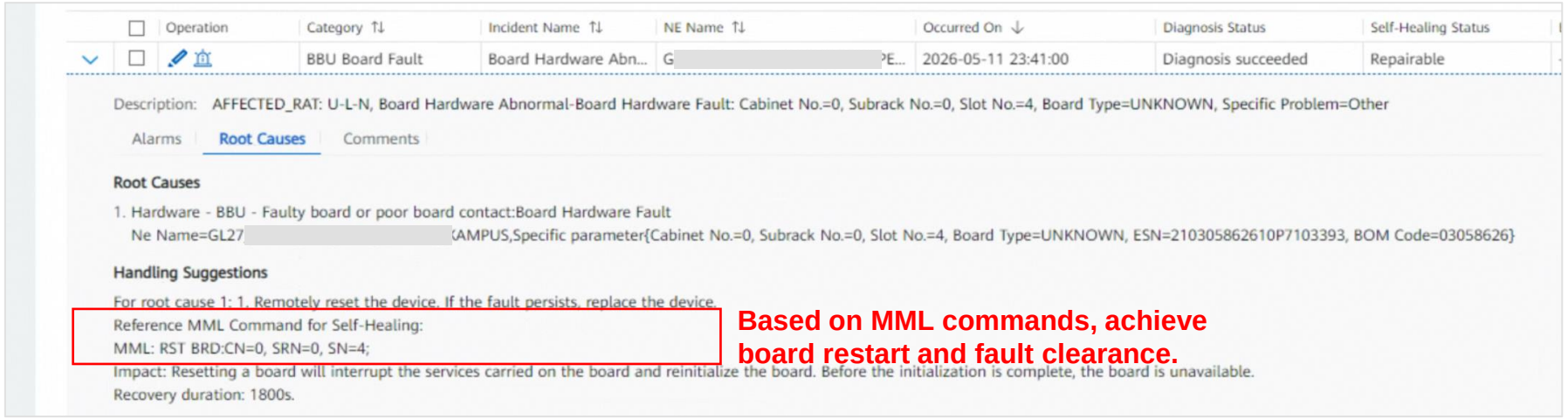
Service Capability	Weight	Question	Option A	√ Option B	Option C
Solution implementation	5%	Does the wireless network fault management system support automatic execution of troubleshooting solutions in various scenarios?	1) The system automatically executes the commands/ scripts for the fault that can be remotely recovered. 2) The system support intelligent on-site instruction for the faults that on-site handling is necessary, including support of: - Human leverages natural language to guide Copilot in query optimal troubleshooting checklists. - Human leverages natural language to guide Copilot to automatically verify that the fault is resolved and alarms are cleared, generate the fault repair report (including fill out the trouble ticket record).	Humans use the system to execute instructions. 1)The system executes commands/ scripts for the fault that can be remotely recovered with human confirmation. 2)The on-site handling are assisted by tool, but still requires assistance from NOC.	The recovery solution needs to be manually implemented 1) The recovery solution need to be manually implemented. 2) On-site handling is guided by NOC.

Equipment	Processing Error	Communications	Environmental	Security
B	B	B	B	B

Solution implementation

Evidence：

Equipment - B



Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status	Self-Healing Status
	BBU Board Fault	Board Hardware Abn...	G[redacted]E...	2026-05-11 23:41:00	Diagnosis succeeded	Repairable

Description: AFFECTED_RAT: U-L-N, Board Hardware Abnormal-Board Hardware Fault: Cabinet No.=0, Subrack No.=0, Slot No.=4, Board Type=UNKNOWN, Specific Problem=Other

Alarms | Root Causes | Comments

Root Causes

1. Hardware - BBU - Faulty board or poor board contact:Board Hardware Fault
   Ne Name=GL27[redacted]CAMPUS,Specific parameter{Cabinet No.=0, Subrack No.=0, Slot No.=4, Board Type=UNKNOWN, ESN=210305862610P7103393, BOM Code=03058626}

Handling Suggestions

For root cause 1: 1. Remotely reset the device. If the fault persists, replace the device.
Reference MML Command for Self-Healing:
MML: RST BRD:CN=0, SRN=0, SN=4;
Impact: Resetting a board will interrupt the services carried on the board and reinitialize the board. Before the initialization is complete, the board is unavailable.
Recovery duration: 1800s.

Based on MML commands, achieve board restart and fault clearance.

Processing Error - B

Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status
	Cell Fault	4G Cell Capability Degraded-Cell Capability Degraded	S[redacted]ZA	2026-05-11 01:10:07	Diagnosis succeeded

Description: AFFECTED_RAT: U-L, 4G Cell Capability Degraded-Cell Capability Degraded: eNodeB Function Name=EN[redacted]Local Cell ID=82, Cell FDD TDD indication=FDD, NB-IoT Cell Flag=FALSE, TX Channel Numbers In The Cell=1, RX Channel Numbers In The Cell=2, Cell Name=LM264725O555065382, eNodeB ID=50653, Cell ID=82, Specific Problem=Baseband resource derating

Alarms | Root Causes | Comments

Root Causes

1. Configuration - Incorrect configuration:Baseband resource derating
   Ne Name=S[redacted]ZA,Specific parameter{ Local Cell ID=82, Cell Name=LM264725O555065382, Cell ID=82}

Handling Suggestions

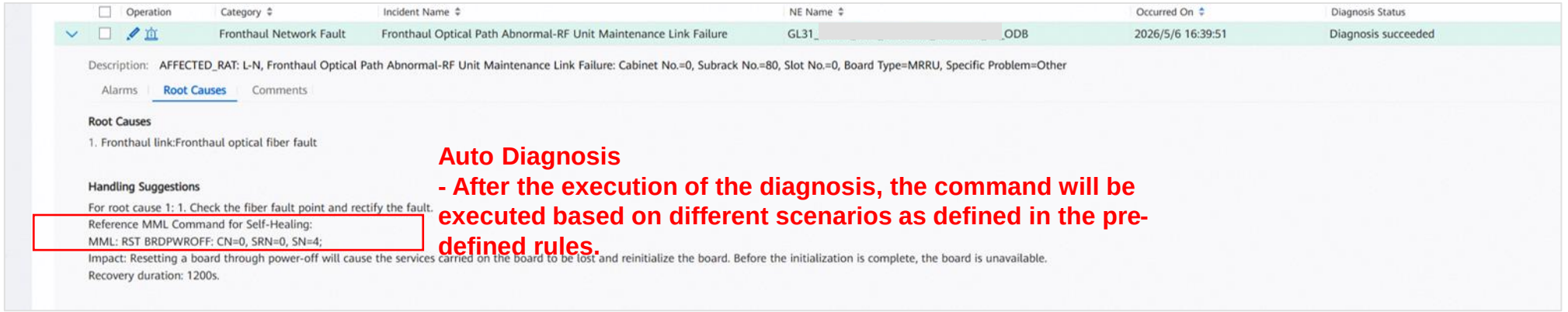
For root cause 1: Check and modify the cell configuration based on the network plan.
Reference MML Command for Self-Healing:
MML: RST BRDPWROFF: CN=0, SRN=84, SN=0;
Impact: Resetting a board through power-off will cause the services carried on the board to be lost and reinitialize the board. Before the initialization is complete, the board is unavailable.
Recovery duration: 960s.

Based on MML commands, achieve board power off restart and self-healing.

Solution implementation

Evidence：

Communications - B



Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status
	Fronthaul Network Fault	Fronthaul Optical Path Abnormal-RF Unit Maintenance Link Failure	GL31_ _ODB	2026/5/6 16:39:51	Diagnosis succeeded

Description: AFFECTED_RAT: L-N, Fronthaul Optical Path Abnormal-RF Unit Maintenance Link Failure: Cabinet No.=0, Subrack No.=80, Slot No.=0, Board Type=MRRU, Specific Problem=Other

Alarms | Root Causes | Comments

Root Causes

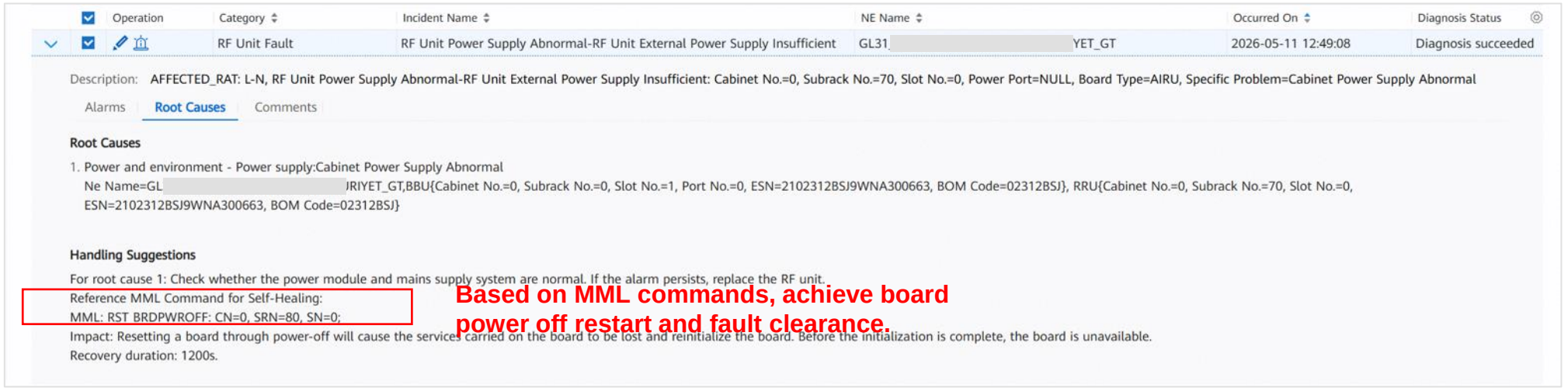
1. Fronthaul link:Fronthaul optical fiber fault

Handling Suggestions

For root cause 1: 1. Check the fiber fault point and rectify the fault.
Reference MML Command for Self-Healing:
MML: RST BRDPWROFF: CN=0, SRN=0, SN=4;
Impact: Resetting a board through power-off will cause the services carried on the board to be lost and reinitialize the board. Before the initialization is complete, the board is unavailable.
Recovery duration: 1200s.

Auto Diagnosis
- After the execution of the diagnosis, the command will be executed based on different scenarios as defined in the pre-defined rules.

Environmental - B



Operation	Category	Incident Name	NE Name	Occurred On	Diagnosis Status
	RF Unit Fault	RF Unit Power Supply Abnormal-RF Unit External Power Supply Insufficient	GL31 YET_GT	2026-05-11 12:49:08	Diagnosis succeeded

Description: AFFECTED_RAT: L-N, RF Unit Power Supply Abnormal-RF Unit External Power Supply Insufficient: Cabinet No.=0, Subrack No.=70, Slot No.=0, Power Port=NULL, Board Type=AIRU, Specific Problem=Cabinet Power Supply Abnormal

Alarms | Root Causes | Comments

Root Causes

1. Power and environment - Power supply:Cabinet Power Supply Abnormal
Ne Name=GL JRIYET_GT,BBU{Cabinet No.=0, Subrack No.=0, Slot No.=1, Port No.=0, ESN=2102312BSJ9WNA300663, BOM Code=02312BSJ}, RRU{Cabinet No.=0, Subrack No.=70, Slot No.=0, ESN=2102312BSJ9WNA300663, BOM Code=02312BSJ}

Handling Suggestions

For root cause 1: Check whether the power module and mains supply system are normal. If the alarm persists, replace the RF unit.
Reference MML Command for Self-Healing:
MML: RST BRDPWROFF: CN=0, SRN=80, SN=0;
Impact: Resetting a board through power-off will cause the services carried on the board to be lost and reinitialize the board. Before the initialization is complete, the board is unavailable.
Recovery duration: 1200s.

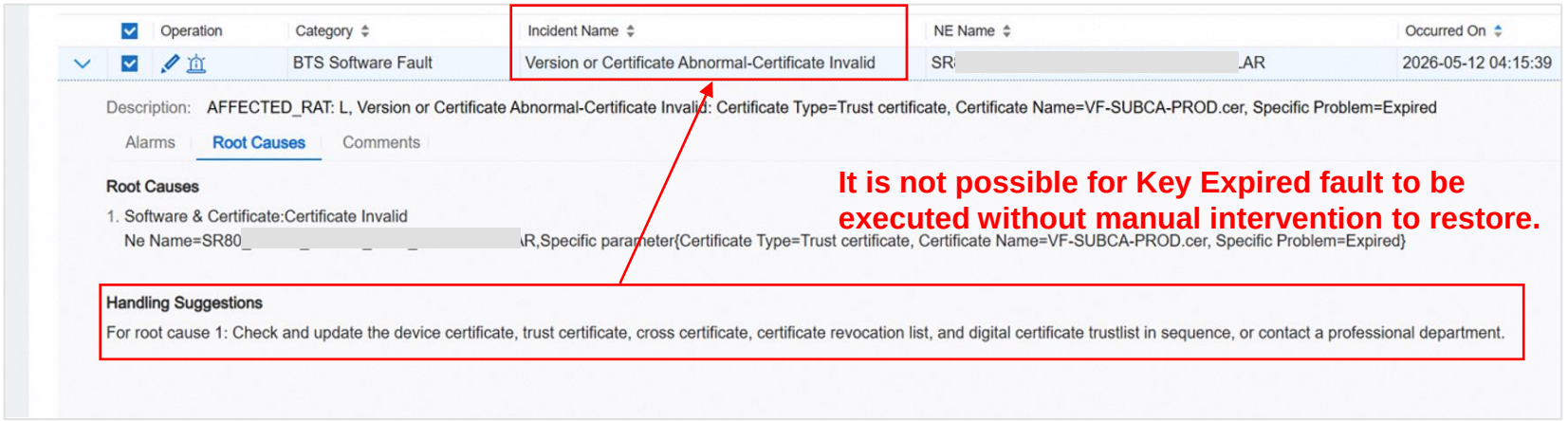
Based on MML commands, achieve board power off restart and fault clearance.

Solution implementation

Evidence：

Security - B

Key Expired fault



It is not possible for Key Expired fault to be executed without manual intervention to restore.

Thank you.