

TM Forum

ANLAV Report

Vodafone Türkiye

GB1523D – Transport Network Fault Management

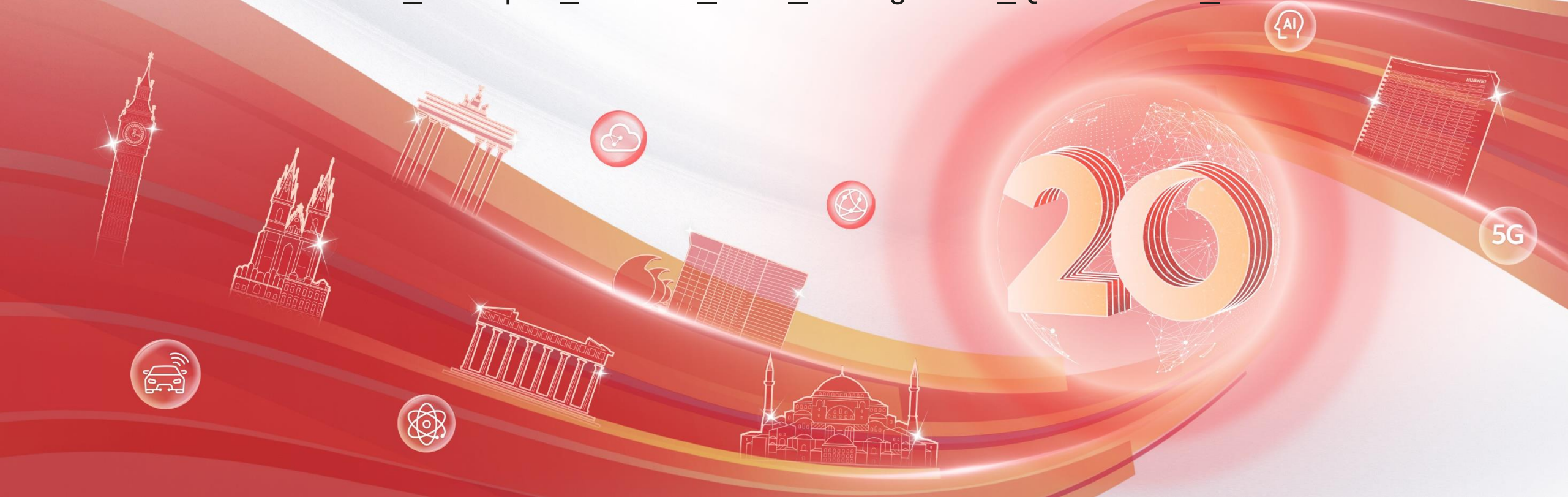
Version: 2.0.0

Score: 3.6 (3.57)

Vodafone Türkiye Transport Network Fault Management

ANL Assessment

GB1523D_Transport_Network_Fault_Management_Questionnaire_v2.0.0



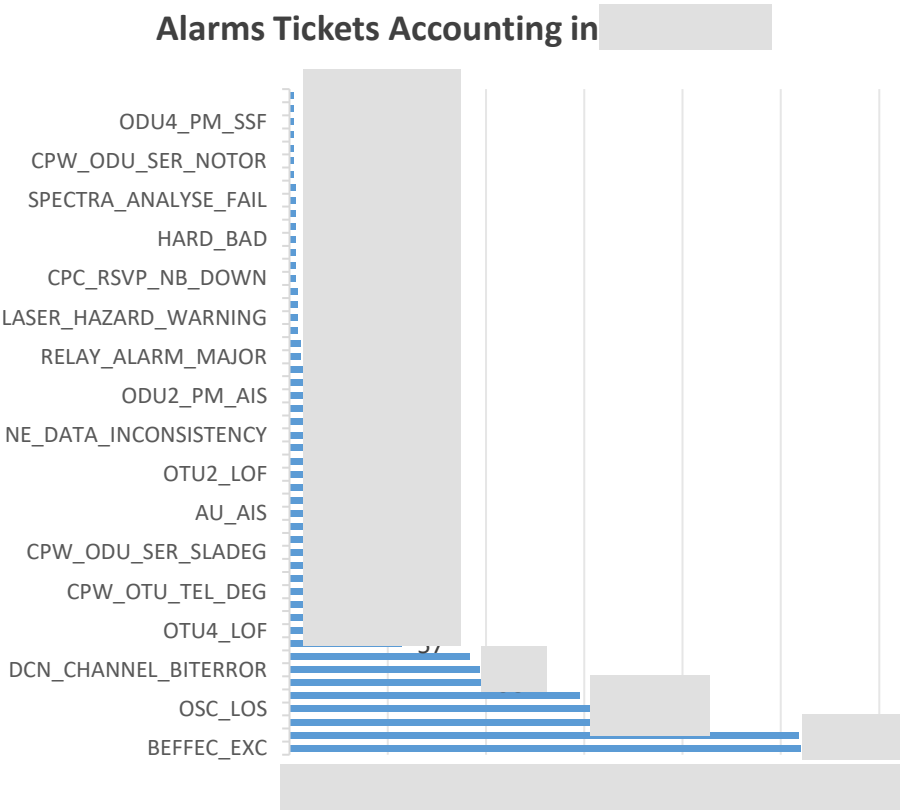
WDM Fault Management ANL Assessment Overall Score

Cognitive Activities (IAADE)	Service capability	Weight	OTN						Final Score
			Equipment	Communication				Environmental	
			Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature	
			9%	54%	14%	1%	19%	3%	
Intent	Fault management target formulation	10%	B	A	B	B	B	B	3.6
Awareness	Data Collection & Alarm filtering	10%	A	A	A	B	A	A	
	Fault prediction and risk identification	15%	C	A	A	C	A	B	
Analysis	Fault identification & Impact analysis	10%	A	A	A	A	A	A	
	Fault Demarcation & Locating	20%	A	A	A	B	A	A	
	Solution generation	10%	A	A	A	B	A	B	
Decision	Solution evaluation & Decision making	10%	B	A	B	B	A	C	
Execution	Solution implementation and verification	15%	B	B	A	C	C	C	



VFTR Applies for adjusting the scenario proportion based on the actual work order

	OTN					
	Equipment	Communication				Environmental
	Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
TMF Questionnaire	10%	45%	20%	10%	10%	5%
VFTR Work Order in	9%	54%	14%	1%	19%	3%



Alarm Scenario Classification Rules					
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
DCN_CHANNEL_BITERROR, GNE_CONNECT_FAIL COMMUN_FAIL NE_DATA_INCONSISTENCY FAN_SPEED_FLUCT LASER_HAZARD_WARNING HARD_ERR SPECTRA_ANALYSE_FAIL IPA_ABNORMAL	MUT_LOS, OSC_LOS R_LOS NE_COMMU_GNE_SWITCH NE_COMMU_BREAK CPW_OTU_TEL_DEG CPW_OTU_TEL_DOWN CPW_ODU_SER_SLADeg ODU_SNCP_STA_INDICATOR_LOF AU_AIS BP_ODU_LOFLOM REMOTE_FAULT ODU_SNCP_PS CPC_RSVP_NB_DOWN CPW_ODU_SER_PRERTF HARD_BAD ALM_GFP_dLFD CPW_ODU_SER_NOTOR CPW_ODU_TEL_DOWN ODU4_PM_SSF	IN_PWR_LOW, IN_PWR_HIGH SUM_INPWR_LOW CHAN_PWR_HIGH OA_LOW_GAIN SUM_INPWR_HI POWER_JITTER	RELAY_ALARM_CRITICAL, RELAY_ALARM_MAJOR ETH_LOS RELAY_ALARM_MINOR	BEFFEC_EXC, OTU4_LOF OTUCN_LOF OTU2_LOF ODU2_PM_AIS ODU2_PM_SSF XCP_DEGRADE	AMBIENT_TEMP_FLUCT TEMP_OVER POWER_FAIL

Intent

Cognitive Activities	Service capability	Weight	Question	√ Option A	√ Option B	√ Option C	Option D
Intent	Fault management target formulation	10%	How does the system support fault management intent translation, and generate fault management task targets, policies and reports based on intent? Note: The Intent could be 1) declarative intent (e.g. emergency restoration priority, customized troubleshooting preference, 2) natural language intent (e.g. NOC/FME request system to monitoring and handling the fault for the big event, analyze a specific fault occurred in the specified optical channel (OCH))	1) The system supports the input of fault management intent by simplified human-system interaction (e.g., nature language user interface provided by system), system automatically translates the intent into fault management targets, policies. 2) The system automatically generates reports for fault management tasks, providing overview of fault management results, including automatically fault-handling results and the suggestions for faults that required manually handling, etc.	The system supports manual configuration of fault management targets with policies. Manual supplementation and adjustment are needed.	The system supports generation of limited fault management targets with pre-defined rules.	Manually define fault management targets based on expertise (such as setting alarm severity and classification).

Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
B	A	B	B	B	B



Intent Evidence: Board/Module Fault (B)

The ASON rerouting policies are configured for the board/module fault by global setting or single trail setting shown as below with manual adjustment needed.

Physical Topology

NE Upgrade ...

Inventory Re...

Wavelength ...

WDM/OTN A...

WDM/OTN A...

Name	Alarm	Source	Source Wav...	Source C...	Sink	Sink Wavels...	Sink Cha...	ASON	Level	Rate	Servi...	Time...	Servi...	Adj...	Activ...	Class	Dir...	SNC...
	No Alarm	POP1	1802	1	T-1	1	1	OTN ASON Tr...	ODU2	Standard M...	-	-	-	-	Active	Diamond	Bidirectional	SNC/N
	No Alarm	T-T09	NE...	1	PC	1	1	OTN ASON Tr...	ODU2	Standard M...	-	-	-	-	Active	Diamond	Bidirectional	SNC/N
	Critical Alarm	T-T09													Active	Diamond	Bidirectional	SNC/N
	No Alarm	T-T09													Active	Diamond	Bidirectional	SNC/N
	No Alarm	T-T09													Active	Diamond	Bidirectional	SNC/N
	No Alarm	T-T09													Active	Diamond	Bidirectional	SNC/N
	No Alarm	T-T09													Active	Diamond	Bidirectional	SNC/N

WDM/OTN ASON Trail Details

Basic Properties

SLA-Compliant Details

Restrictive Route

Associated ASON Trail Properties

Section ID

Optical Parameter Constraints

Distance Restrictions Met

Working: Yes | Protection: Yes

Source Access Point

SNCP Switching Upon SD

Yes

Release Original Route Resources

Disabled

Optimization Status

Working Unoptimized | Protection Unoptimized

Optical-Electrical Synergy Rerouting Policy

Reroute separately

Optical-Electrical Synergy Reversion Policy

Appointed Creation Retry Period(s)

Route Separate Automatically

Unconfiguration

Hitless Protection

Active/Standby Flag

OTSN

Shared Resource

Protect Appointed Optimization Time

Retry Period for Protection Route Appointed Optimization(s)

Released

No

Rerouting Optical Parameter Constraint Status

Single-wavelength Rerouting

OTSN Uses Shared Resources

Set Working Route as Original Route

Set Protection Route as Original Route

First Interrupt Return Policy

Disabled

Service Binding Group ID

0

Work Appointed Optimization Time

Retry Period for Working Route Appointed Optimization(s)

Node Separation Policy

Disabled

Reroute Adjust Wavelength

Complete Overlap Policy for Associated Services

Disabled

Set Working Route as Original Route

Adjust Service Timeslot

Section Ring Restoration Policy

Disabled

Auto Select Original Route

Disabled

Auto Restore Original Selective Receiving

Status: Yes

WTR Time (s): 300

TE Policy Details

TE Policy: NE Mode

Bandwidth Usage

Weight of Bandwidth

Weight of Distance

Weight of Hops

Custom Weight

Delay Weight

SD Switching Details

SD Detection Type: The Network SNCP

SD Detection Time Window: Disabled

SD Detection Time

SD Threshold

Associated Route

Preset Restoration Trail 1

Actual Route

Original Route

Jump To Faulty Point Restoration Trail

Service Name

Source

Sink

AB... A...

TY... 22

CL... PC

AB... T...

JM... T...

IR... D...

B... PC

ER... 22

CL... A...

TY... T...

ER... D...

B... T...

IR... T...

JM... T...

Route View

Signal Flow Diagram

Performance

Synchronize

Report

Print...

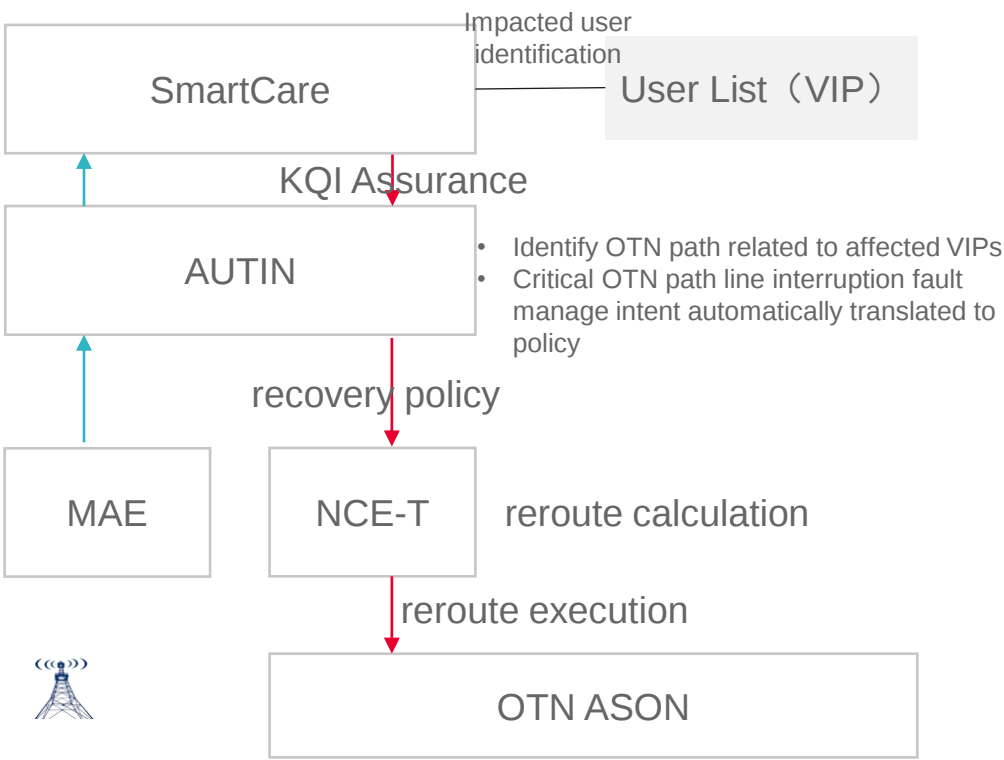
Save As...

2



Intent Evidence: Line Interruption Fault (A)

- VFTR SmartCare system identifies RAN fault impact to VIP users and requests AUTIN to assure KQI.
- AUTIN AI model identifies the OTN path related to affected VIPs, marks as critical OTN path and translates the fault intent to recovery policy.
- The recovery policy is set to transport NMS by north API.



OWS Home Page Monthly Alarm Count Report Affected Users Statistics x

Alarm Serial No Alarm Name MSISDN

Site Name Cell Name City

County Alarm First Occu... 2026-06-14 00:00:00 2026-06-14 23:59:59 Alarm Clear Time All

Alarm Duration ... All Display information Search

SmartCare: Impacted user identification

After Web P...	After Video ...	After Video ...	After Voice ...	After Voice ...	After Voice ...	After Voice ...	After Other ...	Impacted Us...
0	0	0	0	0	0	0	20.013804	
0	0	0	0	0	0	0	18.001674	
0	0	0	0	0	0	0	0	
966.16812	2429.8	3107	0	0	0	0	33.181762	
0	0	0	0	0	0	0	56.740079	
0	0	0	0	0	0	0	51.479784	
813.37067	0	0	0	0	0	0	111.119659	
213.18813	105.224	0	0	0	0	0	42.35618	
0	0	0	0	0	0	0	14.679496	
0	0	0	0	0	0	0	18.261981	

```
2026-06-13 18:24:12.349+0800 INFO [https-jsse-nio-127.0.0.1-25919-exec-1-4ec792018115cccc][ROOT][RouteID-nbiactnbservice-8-0-230713182410-33443][82debbdb-8751-44c7-88ba-0b649727feac][co
m.huawei.actnmbi.util.converter.BoardOduPathInfo 149] channelId is not in range.
2026-06-13 18:24:12.349+0800 INFO [https-jsse-nio-127.0.0.1-25919-exec-1-4ec792018115cccc][ROOT][RouteID-nbiactnbservice-8-0-230713182410-33443][82debbdb-8751-44c7-88ba-0b649727feac][co
m.huawei.actnmbi.util.converter.BoardOduPathInfo 149] channelId is not in range.
2026-06-13 18:24:12.349+0800 INFO [https-jsse-nio-127.0.0.1-25919-exec-1-4ec792018115cccc][ROOT][RouteID-nbiactnbservice-8-0-230713182410-33443][82debbdb-8751-44c7-88ba-0b649727feac][co
m.huawei.actnmbi.util.converter.BoardOduPathInfo 149] channelId is not in range.
2026-06-13 18:24:12.353+0800 INFO [https-jsse-nio-127.0.0.1-25919-exec-7-4ec792018115cccc][ROOT][RouteID-nbiactnbservice-8-0-230713182410-33443][82debbdb-8751-44c7-88ba-0b649727feac][co
m.huawei.actnmbi.util.common.RestfulProxyUtil 69] invoke api:[GET /restconf/data/ietf-te:te:tunnel/b8bb4cbb-dale-4f55-9939-7fde9259a7 modify or delete preProcessor function success!
2026-06-13 18:24:12.361+0800 INFO [https-jsse-nio-127.0.0.1-25919-exec-7-4ec792018115cccc][ROOT][RouteID-nbiactnbservice-8-0-230713182410-33443][82debbdb-8751-44c7-88ba-0b649727feac][co
m.huawei.actnmbi.funns.PrePostProcessorFuns 155] tunnel: b8bb4cbb-dale-4f55-9939-7fde9259a7 modify or delete preProcessor function success!
2026-06-13 18:24:19.229+0800 WARN [pool-28-thread-2][ROOT][][][com.huawei.actnmbi.mmcCustomCustom3FlowHandler 52] success to req /restconf/v2/operations/ietf-trans-client-service:c
lient-svc-path-compute
2026-06-13 18:24:22.319+0800 INFO [pool-28-thread-2][ROOT][][][com.huawei.actnmbi.pipe.SvcDeleteSuccessProcessPipe 64] SvcProcessPipeDTO:{\ietf-trans-client-service:client-svc-inst
ances\":[{\client-svc-name\":"848c3b52-2c58-4bb8-8e75-4fd4d5a78aa5\","optimizations\":[\optimization-metric\":[{\metric-role\":"work\","metric-type\":"ietf-te-types:path-metric-
Delay-minimum\"}]]]]}
2026-06-13 18:24:22.354+0800 INFO [kafka-producer-network-thread | producer-NBIACNService-topic_nbi_actn][ROOT][][][com.huawei.cloudsop.snb.nb.com.common.util.log.MessageSendLogUtil
ls 33] send doSend topic_nbi_actn-0-47511-[messageId]-[channelId]cd12c4b8-2f4a-4e0a-bd07-45271b6226bb,0d5alc0d-775b-46db-8742-e9c6f5511a06 true : time cost is 31
2026-06-13 18:24:22.354+0800 INFO [kafka-producer-network-thread | producer-NBIACNService-topic_nbi_actn][ROOT][][][com.huawei.cloudsop.snb.nb.com.common.util.log.MessageSendLogUtil
ls 33] send doSend topic_nbi_actn-0-47512-[messageId]-[channelId]cd12c4b8-2f4a-4e0a-bd07-45271b6226bb,0d5alc0d-775b-46db-8742-e9c6f5511a06 true : time cost is 32
2026-06-13 18:24:29.652+0800 INFO [kafka-producer-network-thread | producer-NBIACNService-topic_nbi_actn][ROOT][][][com.huawei.cloudsop.snb.nb.com.common.util.log.MessageSendLogUtil
ls 33] send doSend topic_nbi_actn-0-47515-[messageId]-[channelId]cd12c4b8-2f4a-4e0a-bd07-45271b6226bb,0d5alc0d-775b-46db-8742-e9c6f5511a06 true : time cost is 22
2026-06-13 18:24:30.440+0800 INFO [kafka-producer-network-thread | producer-NBIACNService-topic_nbi_actn][ROOT][][][com.huawei.cloudsop.snb.nb.com.common.util.log.MessageSendLogUtil
```



Intent Evidence: Optical Power Fault (B)

The ASON rerouting policies are configured for the optical power fault by global setting or single trail setting shown as below with manual adjustment needed.

Intent Evidence: Client Side Fault (B)

For client side fault, series of rules are combined into policy to correlate alarm and analysis of client side accessing equipment.

iMaster NCE

Topology

Monitor

Configuration

Service

Maintenance

Resource

System

Security

Physical Topology

NE Upgrade ...

Inventory Re...

Wavelength ...

WDM/OTN A...

WDM/OTN A...

Alarm Settl...

Alarm Settings

Personalization

Color Settings

Alarm Display Mode

Alarm Sounds

Font Colors

Highlight

Emergency Maintenance...

Operation Menu Sequence

Global Alarm Indicators

Masking Rules

Intermittent/Toggling Rules

Aggregation Rules

Correlation Rules

Redefinition Rules

Auto Acknowledgement R...

Events Set as ADMC Alar...

Correlation Rules

Default

Custom

Disable

Enable

☐	Rule Name ↑↓	Rule Status ↓	Description ↑↓
☒	Alarm Correlation Rule Set for IP Equipment		A set of rules used for alarm correlation analysis of IP equipment
☐	Board Offline -> Link Down	☒ Enabled	An interface on a board is Down when the board is offline
☐	Board Reset -> Link Down	☒ Enabled	An interface on a board is Down when the board is reset
☐	Card Removed -> Link Down	☒ Enabled	An interface on a subcard is Down when the subcard is removed
☐	Crc error alarm notification -> Interface Physic...	☒ Enabled	The interface's crc error, causing the physical port become Down
☐	Crc error alarm notification -> Interface Physic...	☒ Enabled	The interface's crc error, causing the physical port become Down(Entity)
☐	Crc error alarm notification -> Virtual Device P...	☒ Enabled	The interface's crc error, causing the virtual device port become Down
☐	ETH_LOS -> Physical Port Down(BASE)	☒ Enabled	Signal loss, causing related port physical down
☐	ETH_LOS -> Physical Port Down(Entity)	☒ Enabled	Signal loss, causing related port physical down
☐	ETH_LOS -> Virtual Device Port Down	☒ Enabled	Signal loss, causing related port down
☐	Entity Removed -> Link Down	☒ Enabled	An interface on a board is Down when the board is removed
☐	IN_PWR_HIGH_ABN -> IN_PWR_ABN	☒ Enabled	The input optical power is excessively high, causing the input optical power is asbnormal
☐	IN_PWR_LOW_ABN -> IN_PWR_ABN	☒ Enabled	The input optical power is excessively low, causing the input optical power is asbnormal
☐	Interface Physical Down -> Link Down	☒ Enabled	A physical port is Down, causing the protocol status of the corresponding interface to become Down
☐	Interface Physical Down -> OSPF Interface Stat...	☒ Enabled	The physical interfaceenabled with OSPF is Down, causing OSPF Interface to become Down
☐	Interface Physical Down -> OSPF Neighbor Sta	☒ Enabled	The physical interface enabled with OSPF is Down, causing OSPF neighbors to become Down

2

Intent Evidence: Line BER Fault (B)

The ASON rerouting policies are configured for the line BER fault by global setting or single trail setting shown as below with manual adjustment needed.

Physical Topology

NE Upgrade ...

Inventory Re...

Wavelength ...

WDM/OTN A...

WDM/OTN A...

Name	Alarm	Source	Source Wav	Source C...	Sink	Sink Wavelength	Sink Cha...	ASON	Level	Rate	Servi...	Time...	Servi...	Adj...	Activ...	Class	Dirac...	SNC...
O...	No Alarm	PO	9802...	1	T...	Y...	1	OTN ASON Tr...	ODU2	Standard M...	-	-	-	-	Active	Diamond	Bidirectional	SNC/N
O...	No Alarm	T-T	INEY...	1	PC	2...	1	OTN ASON Tr...	ODU2	Standard M...	-	-	-	-	Active	Diamond	Bidirectional	SNC/N
O...	Critical Alarm	T-T													Active	Diamond	Bidirectional	SNC/N
O...	No Alarm	T-T													Active	Diamond	Bidirectional	SNC/N
O...	No Alarm	T-T													Active	Diamond	Bidirectional	SNC/N
O...	No Alarm	T-T													Active	Diamond	Bidirectional	SNC/N

No. 2, Total: 90 Selected: 1 Update at: 2026-05-13 16:32:17

Preset Restoration Trail of the Service

Faulty Point Restoration Trail

Separation Policy Restoration Trail

Preset Restoration Trail 2

Associated Route

Preset Restoration Trail 1

Actual Route

Original Route

Jump To Faulty Point Restoration Trail

Jump To Separation Policy Restoration Trail

Jump To Preset Restoration Trail 2

Service Name

Source

Sink

T...	B...	T...
A...	Y...	K...
2...	L...	F...
T...	B...	T...
T...	M...	T...
T...	R...	D...
D...	B...	F...
P...	ER...	K...
2...	L...	T...
A...	Y...	T...
P...	ER...	D...
D...	B...	T...
T...	R...	T...
T...	M...	T...

WDM/OTN ASON Trail Details

Basic Properties

SLA-Compliant Details

Restrictive Route

Associated ASON Trail Properties

Section ID

Optical Parameter Constraints

Current Distance (km)

Distance Restrictions Met

Sink Access Point

Release Original Route Resources

Optical-Electrical Synergy Rerouting Policy

Route Separate Automatically

OTSN

Released

Work Appointed Optimization Time

Retry Period for Working Route Appointed Optimization(s)

Node Separation Policy

Reroute Adjust Wavelength

Complete Overlap Policy for Associated Services

Set Working Route as Original Route

Adjust Service Timeslot

Section Ring Restoration Policy

Auto Select Original Route

Auto Restore Original Selective Receiving

Status

WTR Time (s)

TE Policy Details

TE Policy

Weight of Bandwidth

Weight of Hops

Delay Weight

SD Switching Details

SD Detection Type

SD Detection Time

SD Detection Time Window

SD Threshold

SNCP Switching Upon SD

Optimization Status

Optical-Electrical Synergy Reversion Policy

Appointed Creation Retry Period(s)

Hitless Protection

Active/Standby Flag

Protect Appointed Optimization Time

Retry Period for Protection Route Appointed Optimization(s)

Rerouting Optical Parameter Constraint Status

Single-wavelength Rerouting

OTSN Uses Shared Resources

Set Protection Route as Original Route

First Interrupt Return Policy

Service Binding Group ID

OK

Query

Cancel

Apply

formance

Synchronize

Report

Print...

Save As...

Intent Evidence: Power & high temperature Fault (B)

For power & high temperature fault, the VFTR system automatically finishes the fault management process with policies and manual supplementation are needed.

Case Info

Assignments & Attachments

ICRM & Siebel

Netcool / Zabbix

Can Application

Related Records

KnowledgeBase Details

Case No

Domain Type

TRANSMISSION

Not related with vodafone?

Primetype?

Partial effect?

Icrw_pmo1

Reason Of CC

Transfer Nedeni

Case Informations

Reported By

AUTIN

Originating Department

Transmission Level 1

Case descriptions & Logs

Case Summary

801_S6_O location=0- ; Alsource=B5 ; 17 (This alarm is generated when the ambient temperature of the subrack is fluctuation over 15C)

Brief Content

A temperature-related alarm such as TEMP_OVER or AMBIENT_TEMP_FLUCT is reported and a FM case is created directly.

MF

MAXIMO FAULT MANAGEMENT TR

To

Case Details:

Case Number

Report Date:

Alert Date:

Hostname:

IP Address:

AlertKey:

Zabbix AlarmID:

Reported Priority: Low

Domain Type: TRANSMISSION

Case Type:

Case Info: KYI (INTEMPHIGH)

Case Info Details: equipmentAlarm, [AlarmName = Card over temperature] [ObjectFullName = network:1.229:shelf-2:slot-4:RASPB:tnIntTempHighRaisedNotif:alarmId:11643303]

Alcatel Alarm 2026530923917

Reported By: AUTIN

Originating Department: Transmission Level 1

Responsible Department:

Responsible Person:

Problem Type : Card over temperature -

Severity: MINOR

Changed By:

Status: DRAFT

Pending Type:

Pending Info:

Remark:

Click on the link below to go directly to the record.

<https://mas.manage.maximo.vodafone.com.tr/maximo/osc/graphite/manage-shell/index.html?event=loadapp&value=FAULTMAN&uniqueId=405588281>

The field team's control steps are as follows:

1. Check the room temperature.
2. Check the air conditioning status.
3. Check the air conditioning settings.
4. Check and clean the equipment ventilation filters.
5. Check the equipment fans.
6. Check the shelf/cabinet power supply.
7. If a single board temperature is excessive, check the board.
8. Check the shelf temperature.

This FM case is directly forwarded to the regional/field supervisor team via email automatically. Then the field team is assigned to the relevant site and repair the fault by checklist policies.



Data Collection & Alarm filtering

Cognitive Activities	Service capability	Weight	Question	√ Option A	√ Option B	Option C	Option D
Awareness	Data Collection & Alarm filtering	10%	How does the system support data collection of fault-related indicators, including alarms, logs, configuration, performance data, etc.?	The system can automatically collect alarm data and adaptively generate dynamic data-collection policies for related logs, configurations, and real-time performance metrics based on changing network conditions. The collected data are adequate to support accurate fault identification, diagnosis, risk prediction and other related operations. The system can automatically perform alarm filtering (i.e., elimination of invalid, repeated, and nonconsequential alarms) and correlation based on self-learning intelligent models.	The system can automatically collect alarm data, and automatically trigger accurate collection of related log, configuration, real-time performance data etc., based on pre-defined rules (e.g., collecting performance metrics in pre-defined time intervals). The collected data may not be adequate to support precise fault diagnosis. The system can automatically perform alarm filtering and correlation based on pre-defined rules.	The user needs to manually select and use the system to collect related log, configuration, real-time performance data etc. The system can automatically collect alarm data, but the user needs to manually filter out invalid/redundant alarms.	Data collection and alarm filtering of invalid / redundant alarms are manually done.

Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
A	A	A	B	A	A



Data Collection & Alarm filtering Evidence: Automatic data collecting

Real-time Fault Alarm

iMaster NCE										Cumulative Alarms	Alarm Logs	Historical Alarms	Masked Alarms	Event Logs	Alarm Log Statistics	Event Log Statistics	Alarm Settings	Day	Admin	?	
Template Management										Filter											
Alarm Network										Quick Find											
	Operations	Area 2	Alarm Source 1		Location Info 1																

Current performance

^							
Monitored Object ^	Performance Event ^	Monitor Period	Start Time ^	Value MAX	Value CUR ^	Value MIN	Valid
	OTUCN_UAS(s)	15-Minute	2026-06-15 01:45:00	-	665	-	Valid
	OTUCN_TMP(s)	15-Minute	2026-06-15 01:45:00	-	665.00	-	Valid
	ODUCN_PM_UAS(s)	15-Minute	2026-06-15 01:45:00	-	665	-	Valid
	ODUCN_PM_TMP(s)	15-Minute	2026-06-15 01:45:00	-	665.00	-	Valid
	OTUCN_UAS(s)	15-Minute	2026-06-15 01:45:00	-	665	-	Valid

Some data is conditionally collected, for example, second-level optical power performance is collected when need to identify OTS healthy risk.

Fault Type	Foundation data	Additional data
Board/Module Fault	Alarm, configurations	Logs
Line Interruption	Alarm, configurations	Logs, OTDR
Optical Power Fault	Alarm, configurations, Performance	Second-level performance, OTDR, Logs
Client Side Fault	Alarm, configurations	Logs
Line BER	Alarm, configurations, Performance	Second-level performance, OTDR, Logs
power & high temperature	Alarm, configurations	Logs

Operation Logs ⓘ

Filter Criteria

From

2026-06-14 01:50:57

to

2026-06-16 01:50:57

Filter by Template

Template Operations

Reset

Filter

Export AllExport Selected

☐	Operation 1↓	Level 1↓	Operator 1↓	Time 1↓	Source 1↓	Terminal IP Address 1↓	Operation Object 1↓	Result 1↓	Details
☐	Deploy Profile	⚠ Risk		2026-06-15 01:38:56	Profile Manage	10.25.54.151	Minimum Latency	✔ Successful	Profile name:Minimum Latency
☐	UnDeploy Profile	⚠ Risk		2026-06-15 01:38:53	Profile Manage	10.25.54.151	Minimum Latency	✔ Successful	Profile name:Minimum Latency
☐	Deploy Profile	⚠ Risk		2026-06-15 01:38:47	Profile Manage	10.25.54.151	Minimum Latency	✔ Successful	Profile name:Minimum Latency
☐	Modify Client Service ...	⚠ Risk		2026-06-15 01:38:47	Profile Manage	10.25.54.151	Minimum Latency	✔ Successful	Networking type:P2P,Protection ...

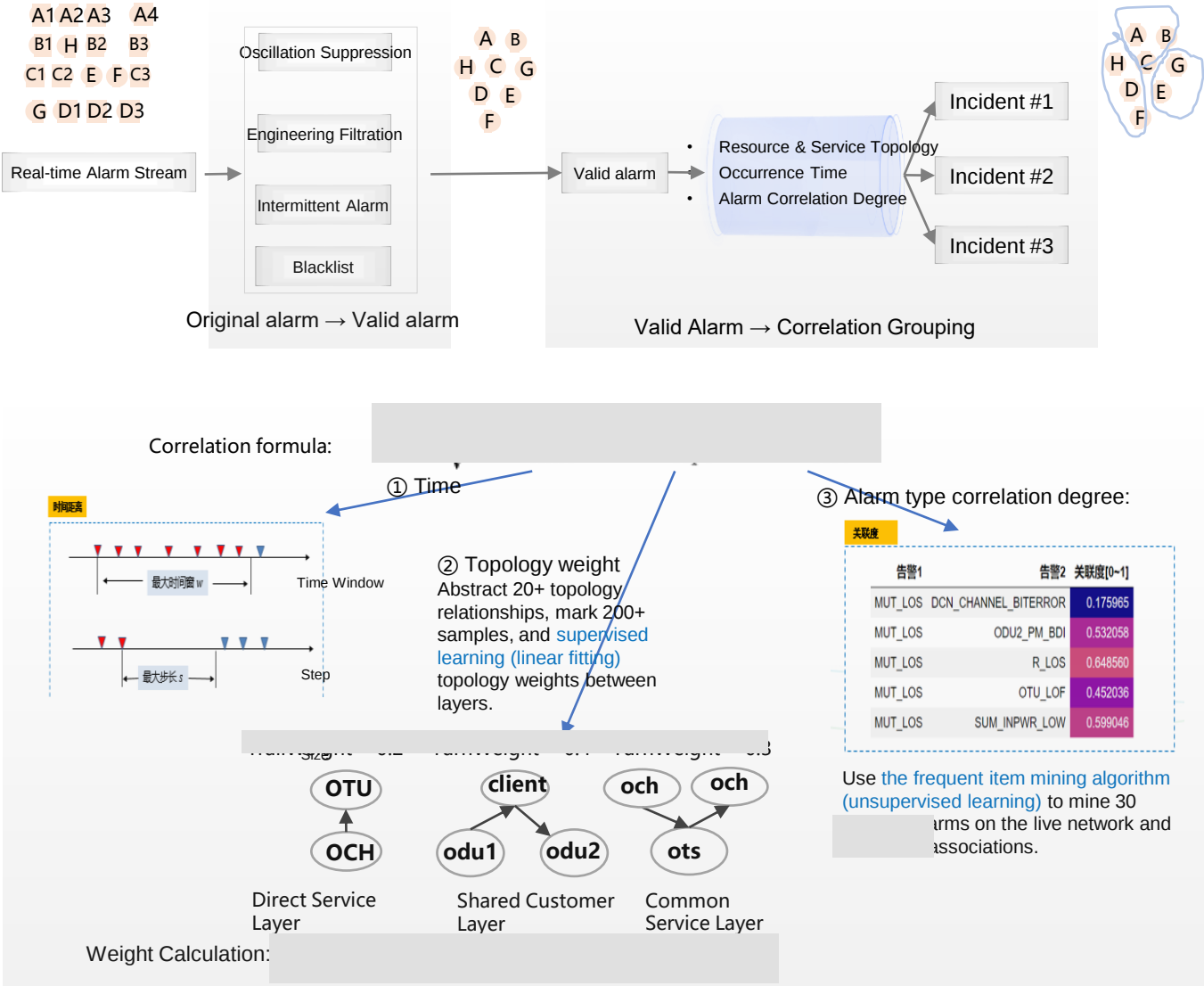
NE configuration periodically backup

NE Configuration										
NE ^	NE Type(MPU Type) ^	Logged in ^	NE Status ^	Gateway/Non-Gateway ^	Sync Status ^	NE Preconfiguration/NE Offline Configuration ^	NE Version ^	Planning Status ^	Operation Result/Remark ^	NE M
NE Configuration	0	Yes	Configured	Gateway	Synchronized	No	5.67.19.88	Invalid		nemgr_
		Yes	Configured	Gateway	Unsynchronized	No	5.67.24.26	Invalid		nemgr_
		Yes	Configured	Gateway	Synchronized	No	5.67.19.88	Invalid		nemgr_
		Yes	Configured	Gateway	Unsynchronized	No	5.172.24.26	Invalid		nemgr_
		Yes	Configured	Gateway	Unsynchronized	No	5.172.25.12	Invalid		nemgr_
		Yes	Configured	Gateway	Unsynchronized	No	5.67.24.26	Invalid		nemgr_
		Yes	Configured	Gateway	Synchronized	No	5.172.21.16	Invalid		nemgr_
		Yes	Configured	Gateway	Unsynchronized	No	5.172.24.12	Invalid		nemgr_
		Yes	Configured	Gateway	Unsynchronized	No	5.172.24.12	Invalid		nemgr_
		Yes	Configured	Gateway	Synchronized	No	5.67.19.88	Invalid		nemgr_
NE Configuration	0	Yes	Configured	Gateway	Synchronized	No	5.67.19.88	Invalid		nemgr_
		Yes	Configured	Gateway	Synchronized	No	5.67.19.88	Invalid		nemgr_

[illegible]

Data Collection & Alarm filtering Evidence: Alarms filtering and correlation

Topology, Time and Alarm derive Multi-dimensional Streaming Aggregation AI Model



Log example of the Model Inference

1. 14 alarms related to Line Interruption of a time window are consumed and 3 of which are filtered.

```
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - consume alarm : csn[779849], isCleared[false], raiseTime[1781335226000], modn[15,CP=-1,PP=3][11],OTS=1, domain[OTN], alarmName[CPW OMS TEL DOWN], alarmId[12931]
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - consume alarm : csn[779871], isCleared[false], raiseTime[1781335226000], modn[15,CP=-1,PP=3][11],OTS=1, domain[OTN], alarmName[MUT_LOS], alarmId[186]
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - consume alarm : csn[779875], isCleared[false], raiseTime[1781335228000], modn[25,CP=-1,PP=3][10],CLIENT=1, domain[OTN], alarmName[ALS_ACTIVE], alarmId[13412]
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - filter alarm : csn[779856], isCleared[true], raiseTime[1781335227000], modn[NE=1,OTS=1, domain[OTN], alarmName[CPW OMS TEL DOWN], alarmId[12931], filtering cause[flapping alarm cleared in short time]
...
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - filter alarm : csn[779853], isCleared[false], raiseTime[1781335226000], modn[NE=1,OTS=1, domain[OTN], alarmName[MUT_LOS], alarmId[186], filtering cause[alarms are from engineering NE]
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - consume alarm : csn[779847], isCleared[false], raiseTime[1781335226000], modn[18,CP=-1,PP=3][1],PATH=OCH:1-OTU4:1, domain[OTN], alarmName[CPW OTU TEL DOWN], alarmId[13523]
2026-06-13 15:18:59.408 - [alarm-consumer-otn-1] - INFO - consume alarm : csn[779876], isCleared[false], raiseTime[1781335227000], modn[5,CP=-1,PP=3][2],OSC=1, domain[OTN], alarmName[OSC_LOS], alarmId[12843]
2026-06-13 15:19:02.745 - [alarm-consumer-otn-1] - INFO - filter alarm : csn[779894], isCleared[false], raiseTime[1781335231000], modn[NI=1,CP=-1,PP=0][65535],FB=30[1], domain[OTN], alarmName[BD STATUS], alarmId[119], filtering cause[alarms are from engineering NE]
```

2. 11 alarms correlation are analyzed, Topology Neighbor Distance Query

```
2026-06-13 15:19:05.408 - [topoQuery-2] - INFO - jcrqwyup begin to put alarm into alarmWithTopoQueue: csn[779874], neighborsWithFloatDistance size = 244
2026-06-13 15:19:05.408 - [topoQuery-4] - INFO - vgcysb3s begin to put alarm into alarmWithTopoQueue: csn[779871], neighborsWithFloatDistance size = 253
2026-06-13 15:19:05.408 - [topoQuery-1] - INFO - nqb7ir6n begin to put alarm into alarmWithTopoQueue: csn[779872], neighborsWithFloatDistance size = 244
2026-06-13 15:19:05.408 - [topoQuery-5] - INFO - h88kt577 begin to put alarm into alarmWithTopoQueue: csn[779875], neighborsWithFloatDistance size = 258
2026-06-13 15:19:05.408 - [topoQuery-6] - INFO - mnuifag8 begin to put alarm into alarmWithTopoQueue: csn[779873], neighborsWithFloatDistance size = 246
2026-06-13 15:19:05.409 - [topoQuery-3] - INFO - n1weapaf begin to put alarm into alarmWithTopoQueue: csn[779849], neighborsWithFloatDistance size = 259
2026-06-13 15:19:05.409 - [topoQuery-2] - INFO - 3nas853z begin to put alarm into alarmWithTopoQueue: csn[779847], neighborsWithFloatDistance size = 256
2026-06-13 15:19:07.746 - [topoQuery-5] - INFO - fwsesm92 begin to put alarm into alarmWithTopoQueue: csn[779877], neighborsWithFloatDistance size = 198
2026-06-13 15:19:07.746 - [topoQuery-1] - INFO - vj3oDpla begin to put alarm into alarmWithTopoQueue: csn[779877], neighborsWithFloatDistance size = 259
2026-06-13 15:19:07.746 - [topoQuery-1] - INFO - b7b12czr begin to put alarm into alarmWithTopoQueue: csn[779881], neighborsWithFloatDistance size = 203
2026-06-13 15:19:13.264 - [topoQuery-6] - INFO - f49oh6ie begin to put alarm into alarmWithTopoQueue: csn[779882], neighborsWithFloatDistance size = 259
```

3. Every alarm's association distance and comprehensive weight are analyzed, accordingly include to the incident group

```
2026-06-13 15:19:13.290 - [aggregate-1] - INFO - handleAlarm() -> start to handle alarm, csn[779882], alarmName[MUT_LOS], type[NEW]
2026-06-13 15:19:13.292 - [aggregate-1] - INFO - handleAlarm() -> start to find toConnectTroubles, query existing alarm group cache, existing group count: 2
2026-06-13 15:19:13.318 - [aggregate-1] - INFO - handleAlarm() -> alarmGroupld[268374017] in alarm topo neighbors, matching alarm[779882] with existing alarm group[268374017]:
- alarms in group: 6
- time span: 3300ms
- type distribution: MUT_LOS(3), MUT_LOS(1), OSC_LOS(1), CPW OMS TEL DOWN(1)
2026-06-13 15:19:13.320 - [topoQuery-2] - INFO - comprehensive distance calculation: minimum topology distance=0.3895, minimum time distance=0.05, minimum alarm association distance=0.15, comprehensive distance=0.1545
2026-06-13 15:19:13.331 - [aggregate-1] - INFO - handleAlarm() -> comprehensive distance lower than threshold(1.0), merge alarm [779882(MUT_LOS)] to group[268374017], updated group alarm count: 7
2026-06-13 15:19:13.344 - [aggregate-1] - INFO - handleAlarm() -> update alarm group[268374017]
```

4. An incident group with 11 correlation alarms takes shape

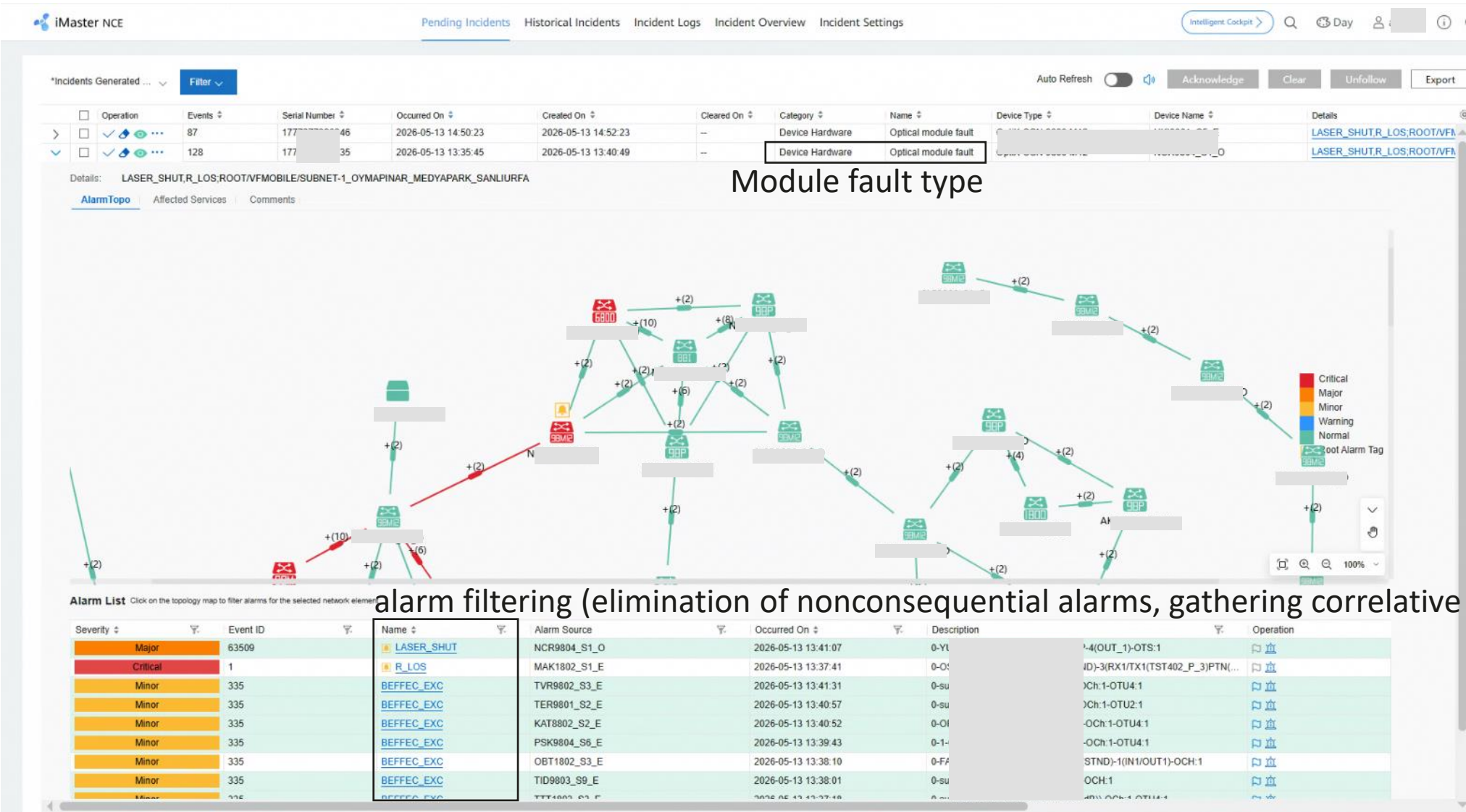
```
2026-06-13 15:20:11.253 - [aggregate-1] - INFO - handleAlarm() -> Report incident key : [otn prod action : [CREATE], status : [INIT] incidentCsn : [1781054369151], alarms : [779874,779875,779876,779877,779881,779871,779882,779872,779873,779849,779847], hashKey : [1781054369151]
2026-06-13 15:20:11.253 - [aggregate-1] - INFO - handleAlarm() -> active alarms aggregate over
```

In each scenario the collected data and correlation group which adequate to support fault identification is visible on the NMS as following pages showing.



Data Collection & Alarm filtering: Board/Module Fault (A)

For board/module fault, the system automatically collects alarm data and adaptively generate dynamic data-collection policies for related logs, configurations, and real-time performance metrics based on changing network conditions.



Data Collection & Alarm filtering: Optical Power Fault (A)

For optical power fault, the system automatically collects alarm data and adaptively generate dynamic data-collection policies for related logs, configurations, and real-time performance metrics based on changing network conditions.

[illegible]

Data Collection & Alarm filtering: Client Side Fault (B)

For client side fault, the system automatically collect alarm data, and automatically trigger accurate collection of related log, configuration, real-time performance data etc., based on pre-defined rules.

Pre-defined rules

Masking Rules	☐	ETH_LOS -> Physical Port Down(BASE)	☒ Enabled	Signal loss, causing related port physical down
Intermittent/Toggling Rules	☐	ETH_LOS -> Physical Port Down(Entity)	☒ Enabled	Signal loss, causing related port physical down
Aggregation Rules	☐	ETH_LOS -> Virtual Device Port Down	☒ Enabled	Signal loss, causing related port down
Correlation Rules	☐	Entity Removed -> Link Down	☒ Enabled	An interface on a board is Down when the board is removed
	☐	IN_PWR_HIGH_ABN -> IN_PWR_ABN	☒ Enabled	The input optical power is excessively high, causing the input optical power is asbnormal

Client side fault type

Client-Side

Client-side line...

OptiX OSN 1800 V Pro

NE(9-217)

ETH_LOS,ROOT/Intelligent Optical Module Test

Unacknowle...

Uncleared

2025-10-24 17:10:20

1772702452708

1

--

1

Details: ETH_LOS,ROOT/Intelligent Optical Module Test

AlarmTopo

Affected Services

Comments

NE(9-217)

Alarm List

Click on the topology map to filter alarms for the selected network element

Severity

Event ID

Name

Alarm Source

Occurred On

Description

Operation

Minor

235

ETH_LOS

N

2025-10-24 17:10:20

0-subrack-11-B1EG10-3(PORT-3)-MAC:1

Total records: 1

alarm data

Data Collection & Alarm filtering: Line BER Fault (A)

For line BER fault, the system automatically collects alarm data and adaptively generate dynamic data-collection policies for related logs, configurations, and real-time performance metrics based on changing network conditions.

Template Management Filter

Auto Refresh ☐ Acknowledge Clear Unfollow Export

☐	Operation	Category	Name	Device Type	Device Name	Details	Acknowledgmen...	Clearance Status	Occurred On	Serial Number	Events	Comments	Occu...
>	☐	Line Degrade	Line signal fail...	OptiX OSN 9800 U32		OTU2_SSF;ROOT/RCA/98	Unacknowle...	Uncleared	2026-03-10 10:21:19	17	4	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 9800 U32		OSUFLEX_PM_SSF;ROOT/RCA/98	Unacknowle...	Uncleared	2026-03-10 10:21:12	17	0	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 9800 U32		OSUFLEX_PM_SSF;ROOT/RCA/98	Unacknowle...	Uncleared	2026-03-10 10:21:12	17	1	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 1800 II E		OTU2_SSF;ROOT/HDF-187-PHY	Unacknowle...	Uncleared	2026-03-07 17:12:41	17	0	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 1800 II E		ODU1_PM_SSF;ROOT/HDF-187-PHY	Unacknowle...	Uncleared	2026-03-07 17:12:40	17	3	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 1800 II E		OTU2_SSF;ROOT/HDF-187-PHY	Unacknowle...	Uncleared	2026-03-07 17:12:37	17	0	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 1800 II E		OTU2_SSF;ROOT/HDF-187-PHY	Unacknowle...	Uncleared	2026-03-07 17:12:37	17	0	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 1800 II E		OTU2_SSF;ROOT/HDF-187-PHY	Unacknowle...	Uncleared	2026-03-07 17:12:36	17	1	--	1
>	☐	Line Degrade	Line signal fail...	OptiX OSN 9800 M24		OTU4_SSF;ROOT/Co-Cable	Unacknowle...	Uncleared	2026-03-07 10:30:12	17	7	--	1

Details: OTU4_SSF;ROOT/Co-Cable

Line BER fault type

[AlarmTopo](#) | [Affected Services](#) | [Comments](#)



- Critical
- Major
- Minor
- Warning
- Normal
- Root Alarm

Alarm List Click on the topology map to filter alarms for the selected network element

alarm filtering (elimination of nonconsequential alarms)

Severity	Event ID	Name	Alarm Source	Occurred On	Description	Operation
Warning	13201	OTU4_SSF		2026-03-07 10:30:12	0-subrack-2-S9N402L-1(IN1/OUT1)-OCh:1-OTU4:1	

Data Collection & Alarm filtering: Power & high temperature Fault (A)

For power & high temperature fault, the system automatically collects alarm data and adaptively generate dynamic data-collection policies for related logs, configurations, and real-time performance metrics.

☐	Operation	Category	Name	Device Type	Device Name	Details	Acknowledmen...	Clearance Status	Occurred On	Serial Number	Events	Comments	Occu...
>	☐	   ...	Power Environ...	Device temper...	Optix OSN 9800 U16	TEMP_OVER;ROOT/HDF-187-PHY	 Unknowle...	 Uncleared	2026-04-22 23:29:08	1	2	--	1
>	☐	   ...	Power Environ...	Device temper...	Optix OSN 9800 M24	AMBIENT_TEMP_OVER,DEV_BASE_DATA_DIF...	 Unknowle...	 Uncleared	2026-03-02 17:52:56	1	2	--	1
>	☐	   ...	Power Environ...	Device temper...	Optix OSN 9800 M24	AMBIENT_TEMP_OVER,TEMP_OVER;ROOT/A...	 Unknowle...	 Uncleared	2026-02-06 16:28:36	1	11	--	1
✓	☐	   ...	Power Environ...	Device temper...	Optix OSN 9800 M24	AMBIENT_TEMP_OVER,TEMP_OVER;ROOT/A...	 Unknowle...	 Uncleared	2026-02-06 16:26:32	1	11	--	1

Power & high temperature fault type

Details: AMBIENT_TEMP_OVER,TEMP_OVER;ROOT/ASON收益

AlarmTopo	Affected Services	Comments
AlarmTopo	Affected Services	Comments



- Critical
 - Major
 - Minor
 - Warning
 - Normal
 - Root Alarm

Alarm List Click on the topology map to filter alarms for the selected network element

alarm filtering (elimination of nonconsequential alarms, gathering correlative alarms)

Severity	Event ID	Name	Alarm Source	Occurred On	Description	Operation
Major	13670	AMBIENT_TEMP_OVER	[Redacted]	2026-02-06 16:27:25	0-subrack	🔔 🔗
Major	14744	DEV_BASE_DATA_DIFF		2026-02-06 16:28:34	0-subrack-71-G1CXP-OTHER	🔔 🔗
Major	12303	SUBRACK_ID_MISMATCH		2026-02-06 16:26:32	0-subrack-103-G1EFI-OTHER	🔔 🔗
Major	28	TEMP_OVER		2026-02-06 16:26:33	0-subrack-106-G2PIU-OTHER	🔔 🔗
Major	28	TEMP_OVER		2026-02-06 16:26:32	0-subrack-100-G2PIU-OTHER	🔔 🔗
Major	28	TEMP_OVER		2026-02-06 16:26:32	0-subrack-101-G2PIU-OTHER	🔔 🔗



Fault prediction and risk identification

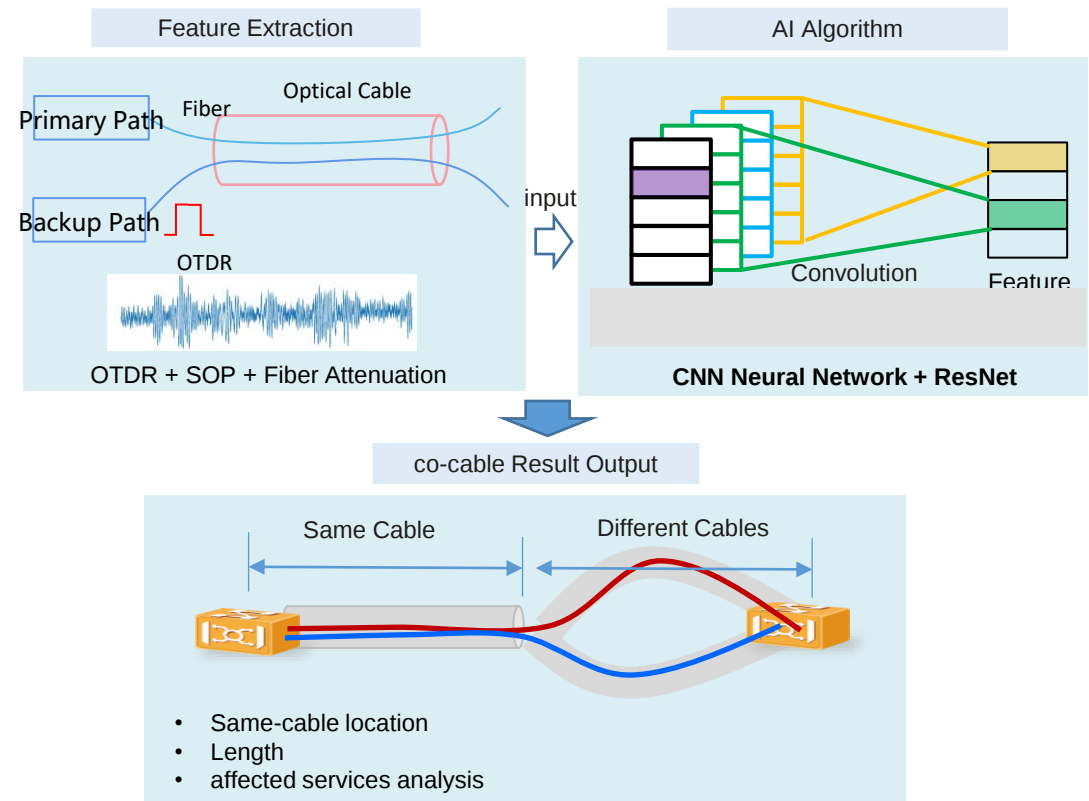
Cognitive Activities	Service capability	Weight	Question	√ Option A	√ Option B	√ Option C	Option D
Awareness	Fault prediction and risk identification	15%	How does the system support prediction of faults, automatic identification of risks? e.g. the system predicts the OTS performance degradation trend; the system identifies the service active/standby route sharing risk.	The system provides real-time detection and analysis of network risk and automatically generates accurate and unambiguous prediction and impact reports based on self-learning intelligent models, without the need for human intervention	The system provides real-time detection and analysis of network risks and their potential impacts, based on policies. The resulting predictions and impact reports may present multiple possible outcomes, and may need human confirmation.	The system manually identifies potential risks based on pre-defined rules.	The system manually identify potential risks based on human expertise and auxiliary tools ((e.g., Optical Time-Domain Reflectometer (OTDR))).

Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
C	A	A	C	A	B



Fault prediction and risk identification: Line Interruption Fault (A)

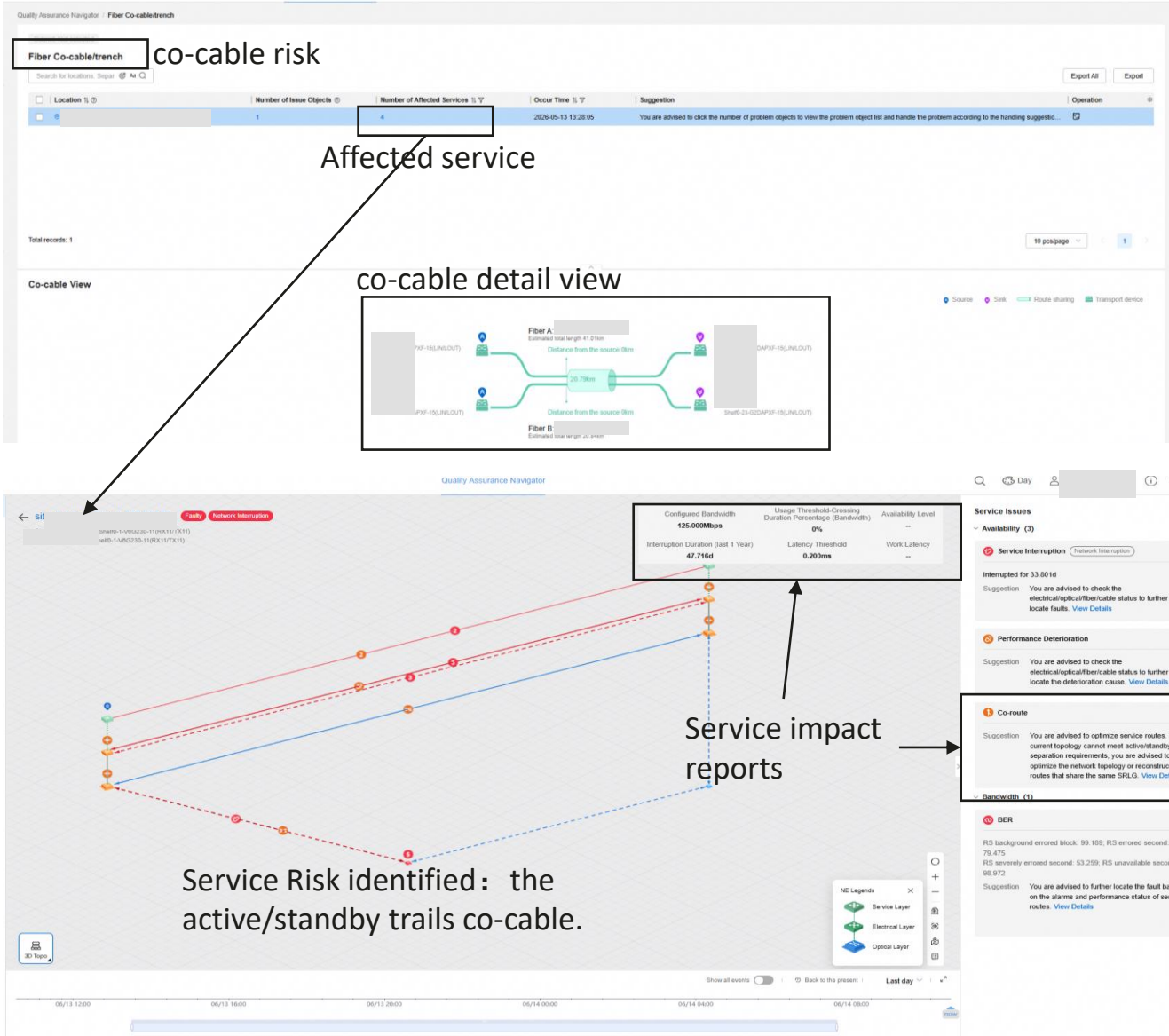
OTN Primary & backup paths co-cable risks online detection AI mode



Log example of the Model Inference

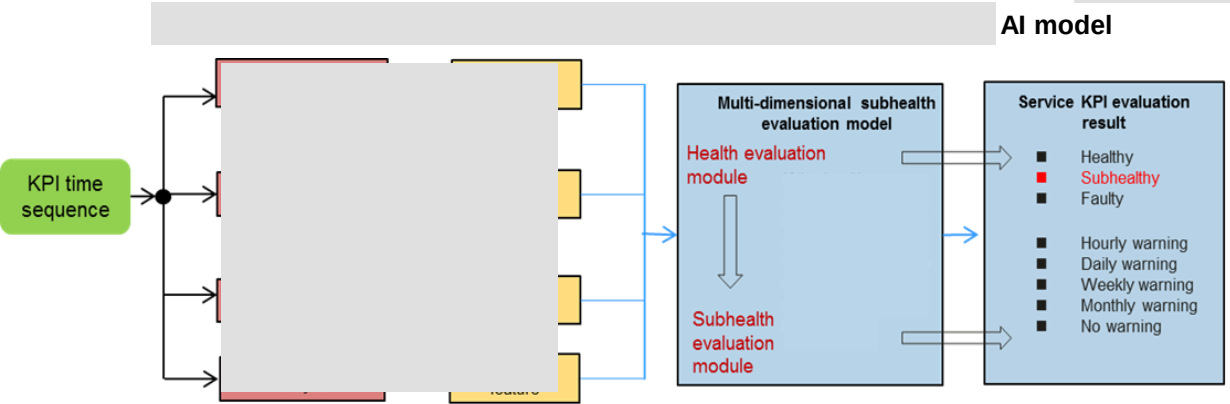
2026-03-31 23:01:53,645 WARN [WaxTopic-6-CoCableDetectionConsumer][c.h.s.c.CoCableService 135] processCoCableResult addGroupInfo=[{aFiberGroupInfo(id=36, processType=1, aFiberUid=6fb2d0e8-c33a-481c-833a-1060787d1252, bFiberUid=e94231b5-a8bc-4cdd-9283-8d223a6e958e, aFiberFullName=null, bFiberFullName=null, riskLevel=2, endTime=1744077182000, exceptionReason=null, aSrcDistance=1.0, bSrcDistance=2.0, coCableDistance=3.0, licenseEnableStatus=0)}, deleteGroupInfo=[]] 2026-03-31 23:01:53,894 WARN [WaxTopic-6-CoCableDetectionConsumer][c.h.s.c.CoCableService 351] processCoCableResult addSlaEventBoList=[{SlaEventBo(id=6da8ae4d-d08d-443f-bf55-433ab088abff, eventId=10305, groupId=10305, tenantId=null, domain=OTN, status=0, arriveTime=null, occurTime=1744077182000, clearTime=0, csN=null, severity=2, eventValue=null, name=Fiber Co-cable/trench, sourceObjType=LinkPair, sourceObjId=b29f8246-b43f-4e2f-96a1-b977f38b49ab,49e57460-ebd3-407a-9c7f-4147910587dd, sourceObjName=lgyn2 98m1-lygn2 98m3-OTS-2637,lgyn2 98m1-lygn2 98m3-OTS-2638, description=null, sourceSystem=coCableDetection, sourceCsn=null, suggestion=You are advised to optimize service routes. If the current topology cannot meet active/standby separation requirements, you are advised to optimize the network topology or reconstruct the routes of the same pair of SRLG fibers, extendData={\"aFiberResId\":\"6fb2d0e8-c33a-481c-833a-1060787d1252\", \"bFiberResId\":\"e94231b5-a8bc-4cdd-9283-8d223a6e958e\", \"coCableDetctid\":\"36\", \"coCableDistance\":\"3.0\", \"coCableType\":\"[101]\", \"jumpObjName\":\"[\"lgyn2 98m1-lygn2 98m3-OTS-2637\", \"lgyn2 98m1-lygn2 98m3-OTS-2638\"]\", \"problemType\":\"\", \"srlgid\":\"\", \"protectOtsLink\":\"[\"layer\":\"OTS\", \"linkOrConnectionName\":\"lgyn2 98m1-lygn2 98m3-OTS-2637\", \"linkOrConnectionUid\":\"b29f8246-b43f-4e2f-96a1-b977f38b49ab\", \"overlapTrails\":\"\", \"sinkPort\":\"\", \"diagnoseInfo\":\"The Co-route passes a same network element.\"\", \"logicalId\":\"167772885\", \"neld\":\"2ef9c523-0b92-4264-9bd0-b0102afbc62\", \"neName\":\"lgyn2 98m3\", \"portId\":\"15\", \"serviceOverlapTrailsRelationList\":\"\", \"shelfId\":\"1\", \"slotId\":\"18\", \"uid\":\"db47a1f-8020-43c3-97bb-f184cefe6bfe\", \"srcPort\":\"\", \"diagnoseInfo\":\"The Co-route passes a same network element.\"\", \"logicalId\":\"167772844\", \"neld\":\"83c02ac3-d2aa-4354-80d0-e4a5db702a9b\", \"neName\":\"lgyn2 98m1\", \"portId\":\"15\", \"serviceOverlapTrailsRelationList\":\"\", \"shelfId\":\"0\", \"slotId\":\"22\", \"uid\":\"3b6aecf2-e823-4406-adf7-c843e88379a4\", \"protectSourceDistance\":\"2.0\", \"srlgid\":\"\", \"trailLevel\":\"OTS,OTS\", \"workOtsLink\":\"[\"layer\":\"OTS\", \"linkOrConnectionName\":\"lgyn2 98m1-lygn2 98m3-OTS-2638\", \"linkOrConnectionUid\":\"49e57460-ebd3-407a-9c7f-4147910587dd\", \"overlapTrails\":\"\", \"sinkPort\":\"\", \"diagnoseInfo\":\"The Co-route passes a same network element.\"\", \"logicalId\":\"167772885\", \"neld\":\"2ef9c523-0b92-4264-9bd0-b0102afbc62\", \"neName\":\"lgyn2 98m3\", \"portId\":\"15\", \"serviceOverlapTrailsRelationList\":\"\", \"shelfId\":\"0\", \"slotId\":\"24\", \"uid\":\"ca55d865-997c-48c1-bc86-2fd28a28d6d4\", \"srcPort\":\"\", \"diagnoseInfo\":\"The Co-route passes a same network element.\"\", \"logicalId\":\"167772844\", \"neld\":\"83c02ac3-d2aa-4354-80d0-e4a5db702a9b\", \"neName\":\"lgyn2 98m1\", \"portId\":\"15\", \"serviceOverlapTrailsRelationList\":\"\", \"shelfId\":\"0\", \"slotId\":\"24\", \"uid\":\"e24b81c9-c025-4bbc-9d1a-abd8fbf47d7c\", \"workSourceDistance\":\"1.0\", \"timelD=null}], updateSlaEventBoList=[]]

Line Interruption related network risk analysis: the 1+1 client service's interruption caused by one-time line interruption fault at the co-cable location risk is automatically identified by the NMS.



Fault prediction and risk identification: Optical Power Fault (A)

For Optical Power fault, the system provides real-time detection and analysis of risk and automatically generates accurate and unambiguous prediction and impact reports based on AI models.



The fiber attenuation data is real-time collected and analyzed by the AI model.

Log example of the Model Inference

```
[1781324100000.0, -19.6, 12.06, 9.0], [1781325000000.0, -19.8, 12.28, 9.0], [1781325900000.0, -19.8, 12.26, 9.0], [1781326700000.0, -19.7, 12.2, 9.0], [1781327700000.0, -19.7, 12.16, 9.0], [1781328600000.0, -19.6, 12.106, 9.0], [1781329500000.0, -19.5, 12.32, 9.0], [1781330400000.0, -19.6, 12.352001, 9.0], [1781331300000.0, -20.1, 12.412, 9.0], [1781332200000.0, -20.0, 12.556, 9.0], [1781333100000.0, -20.0, 12.44, 9.0], [1781334000000.0, -20.3, 12.736, 9.0], [1781334900000.0, -20.3, 12.734, 9.0], [1781335800000.0, -20.3, 12.74, 9.0], [1781336700000.0, -20.4, 12.650001, 9.0], [1781337600000.0, -20.4, 12.864, 9.0], [1781338500000.0, -20.4, 12.876, 9.0], [1781339400000.0, -20.4, 12.876, 9.0], [1781340300000.0, -20.4, 12.876, 9.0], [1781341200000.0, -20.4, 12.86, 9.0], [1781342100000.0, -20.4, 12.86, 9.0], [1781343000000.0, -20.3, 12.86799, 9.0], [1781343900000.0, -20.3, 12.856, 9.0], [1781344800000.0, -20.3, 12.856, 9.0], [1781345700000.0, -20.3, 12.86799, 9.0], [1781346600000.0, -20.3, 12.852001, 9.0], [1781347500000.0, -20.3, 12.852001, 9.0], [1781348400000.0, -20.3, 12.864, 9.0], [1781349300000.0, -20.3, 12.836, 9.0], [1781350200000.0, -20.3, 12.872, 9.0], [1781351100000.0, -20.3, 12.876001, 9.0], [1781352000000.0, -20.3, 12.864, 9.0], [1781352900000.0, -20.3, 12.88399, 9.0], and length of ots value is 700

# *****Fiber Attenuation Data Preprocessing *****
2026-06-13 20:33:07.845 /ops_loggy116 INFO : trigger_analyse entry: data_len=700, train_window=672
2026-06-13 20:33:07.846 /ops_loggy116 INFO : trigger_rule: cur_val=12.88399, cur_thr=9.000000
2026-06-13 20:33:07.846 /ops_loggy116 INFO : trigger_rule result: pre_alarm_time=2, confidence=95
2026-06-13 20:33:07.846 /ops_loggy116 INFO : trigger_analyse data sufficient, proceeding to algorithm prediction

# *****Fiber Attenuation Data Smoothing / Denoising *****
2026-06-13 20:33:07.847 /ops_loggy116 INFO : OTS perform_data_transform: perform_value=len=672, last_val=12.88399, thr=9.000000
2026-06-13 20:33:07.847 /ops_loggy116 INFO : trigger_algorithm: data transformed, perform_value=len=672, last_val=12.88399, thr=9.000000
2026-06-13 20:33:07.847 /ops_loggy116 INFO : STL calc_predict_value entry: data_len=672, first=12.8200, last=12.8840
2026-06-13 20:33:07.860 /ops_loggy116 INFO : smooth_value: noise_std=0.3916, glitches_fixed=0.672
2026-06-13 20:33:07.861 /ops_loggy116 INFO : STL smooth done, len=672

# *****Step Change Detection *****
2026-06-13 20:33:07.870 /ops_loggy116 INFO : get_step_index: found step at index=590, std=0.2907
2026-06-13 20:33:07.871 /ops_loggy116 INFO : STL step index=590 (out of 672)
2026-06-13 20:33:07.884 /ops_loggy116 INFO : smooth_value: noise_std=0.3916, glitches_fixed=0.672

# *****FFT-based Period Detection *****
2026-06-13 20:33:07.884 /ops_loggy116 INFO : get_amplitude_and_season_by_fft: max_amplitude=1.1143, map_index=4, map_season=96
2026-06-13 20:33:07.893 /ops_loggy116 INFO : get_decomposition_result: FFT max_amplitude=1.1143, map_season=96, trend_nan_count=0, seasonal_nan_count=0, max_error=0.0400
2026-06-13 20:33:07.907 /ops_loggy116 INFO : smooth_value: noise_std=0.3916, glitches_fixed=0.672
2026-06-13 20:33:07.908 /ops_loggy116 INFO : get_amplitude_and_season_by_fft: max_amplitude=1.1143, map_index=4, map_season=96

# *****STL Decomposition (Trend + Seasonal + Residual) *****
2026-06-13 20:33:07.916 /ops_loggy116 INFO : get_decomposition_result: FFT max_amplitude=1.1143, map_season=96, trend_nan_count=0, seasonal_nan_count=0, max_error=0.0400
2026-06-13 20:33:07.916 /ops_loggy116 INFO : STL decomposition done, map_season=96, trend_len=672, max_error=0.0400, real_view_window=576

# *****Generalized Linear Regression for Trend Prediction *****
2026-06-13 20:33:07.917 /ops_loggy116 INFO : predict_tsp_by_generalized_linear: model=linear, train_len=576, dim_input=96, predict_season=192
2026-06-13 20:33:07.921 /ops_loggy116 INFO : predict_tsp_by_generalized_linear: result[0]=11.8977, result[1]=11.8902
2026-06-13 20:33:08.033 /ops_loggy116 INFO : calc_trend_predict_value: model=linear, train_len=576, slope=0.0000, predict[0]=11.8977, predict[1]=11.8902, lower[0]=11.8971, upper[0]=11.8993
2026-06-13 20:33:08.033 /ops_loggy116 INFO : STL trend predict done, model=linear, predict_season=192, first_pred=11.8977, last_pred=11.8902
2026-06-13 20:33:08.035 /ops_loggy116 INFO : STL final result upper[0]=12.8885, predict[0]=12.8840, lower[0]=12.8793
2026-06-13 20:33:08.035 /ops_loggy116 INFO : trigger_algorithm: predict_value=[12.8840, 12.8887, 12.8894, 12.8814, 12.8734, 12.8814, 12.8861, 12.8801, 12.8828, 12.8795, 12.8782, 12.8809, 12.8709, 9.9896, 10.1116, 10.3003, 10.2230, 10.2863, 10.3130, 10.2157, 10.2209, 10.3122, 10.1275, 10.2088, 10.2415, 10.3721, 10.5175, 10.4341, 10.6495, 10.5375, 10.8221, 10.8651, 11.0008, 11.1361, 11.1361, 11.2561, 11.3742, 11.3742, 11.3109, 11.3509, 11.4502, 11.4515, 11.4248, 11.5108, 11.5614, 11.6494, 11.6194, 11.6401, 11.7416, 11.8375, 11.7415, 11.8275, 11.6454, 11.7607, 11.8567, 11.9620, 12.0651, 11.9620, 11.8634, 11.9604, 12.1141, 12.1655, 12.0654, 12.2621, 12.3101, 12.3481, 12.2475, 12.1555, 12.8670, 12.8658, 12.8691, 12.8684, 12.8677, 12.8637, 12.8777, 12.8767, 12.8765, 12.8625, 12.8716, 12.8770, 12.8764, 12.8664, 12.8657, 12.8670, 12.8675, 12.8655, 12.8664, 12.8701, 12.8705, 12.8682, 12.8629, 12.8617, 12.8777, 12.8666, 12.8716, 12.8645, 12.8765, 12.8791, 12.8756, 12.8745, 12.8772, 12.8872, 12.8772, 9.9796, 10.1078, 10.2066, 10.2192, 10.2826, 10.3093, 10.2119, 10.2171, 10.3084, 10.1237, 10.2051, 10.2377, 10.3684, 10.5137, 10.4304, 10.4657, 10.5337, 10.8194, 10.8977, 10.9970, 11.1023, 11.1323, 11.2524, 11.1704, 11.3071, 11.3471, 11.4464, 11.4477, 11.4210, 11.5150, 11.5577, 11.6457, 11.6156, 11.6363, 11.7178, 11.8338, 11.7377, 11.6237, 11.6417, 11.7569, 11.8529, 11.9392, 12.0616, 11.9782, 12.0616, 11.8596, 11.9636, 12.1103, 12.1617, 12.2617, 12.2583, 12.3064, 12.3444, 12.2437, 12.1518, 12.3633, 12.3820, 12.4353, 12.5646, 12.4640, 12.6199, 12.7440, 12.7640, 12.8787, 12.8747, 12.8840, 12.8787, 12.8740, 12.8746, 12.8826, 12.8819, 12.8872, 12.8833, 12.8733, 12.8673, 12.8667, 12.8780, 12.8847, 12.8828, 12.8807, 12.8804, 12.8807]

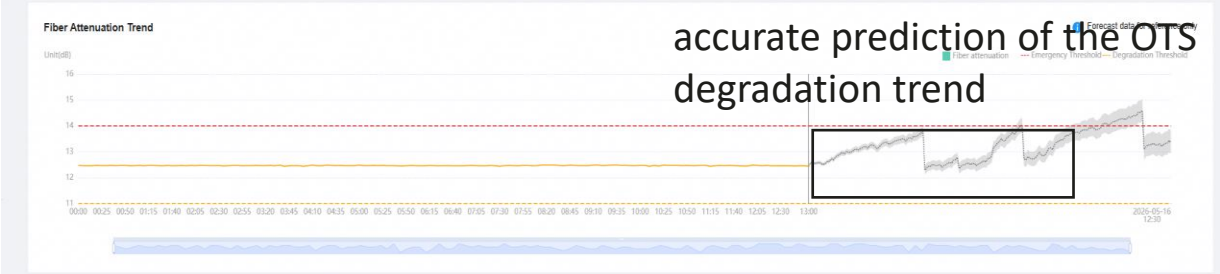
# *****Pre-Alarm Time Extraction & Confidence Calculation *****
2026-06-13 20:33:08.035 /ops_loggy116 INFO : OTS extract_pre_alarm_time: max_predict=12.891015, thr=9.000000 -> IMPORTANT
2026-06-13 20:33:08.035 /ops_loggy116 INFO : calc_confidence entry: upper_len=192, lower_len=192, thr=9.000000, cross_choose=0
2026-06-13 20:33:08.036 /ops_loggy116 INFO : OTS extract_confidence: pre_alarm_time=1, confidence=99.00
2026-06-13 20:33:08.036 /ops_loggy116 INFO : OTS extract_confidence: pre_alarm_time=1, confidence=99.00
2026-06-13 20:33:08.037 /ops_loggy116 INFO : trigger_algorithm: result: pre_alarm_time=1, confidence=99
2026-06-13 20:33:08.037 /ops_loggy116 INFO : trigger_analyse: rule_result=2, 95, algorithm_result=1, 99
2026-06-13 20:33:08.037 /ops_loggy116 INFO : trigger_analyse: result: pre_alarm_time=2, confidence=95

# *****Fiber Attenuation Prediction Log End *****
```

Prediction result and a '99' confidence value is give out.



Then OTS's degrade risk(fiber attenuation loss) is identified.



accurate prediction of the OTS degradation trend

Fiber List History										Export	
Fiber No. ▾	Enter Fiber Name 🔍									Export	
Fiber Name ▾	Fiber Source ▾	Fiber Sink ▾	Health Status ▾	Occurrence Time ▾	Jitters	Jitter Locating ▾	Carried OChs	Total OCh Rate	Associated Ser. ▾	Processing Status	Remarks 🔍
C	site-D-site-D-Shell#0-G3D...	site-B-site-B-Shell#0-G3D...	Subhealthy	2026-06-14 05:25:00	1	Not Supported	1	100.00 Gb/s	4	To be processed	
Total records: 1											

The services impact are analyzed by OTN quality assurance model.

Fault prediction and risk identification: Client Side Fault (C)

For client side fault, the system collects tributary card's performance indicators based on pre-defined rules, manually analyze the change trends, and identify fault risks.

iMaster NCE

TopologyMonitorConfigurationServiceMaintenanceResourceSystemSecurity

Physical TopologyWDM Performance x

+ V
+ V
+ V
+ V
+ V
+ V S6_O

Shelf0(1-ORTAK)
☐ 1-V3GZ20
☐ 2-V5T404
☒ 3-V8T402
☐ 16-V3GZ20
☐ 19-S2N504
☐ 20-S2N504
☐ 27-S3N505
☐ 28-S7N502
☐ 29-S7N502
☐ 30-S2N502
☐ 31-S2N502
☐ 32-S2N504
☐ 70-U2CTU
☐ 71-U1UCXCS
☐ 72-U1UCXCS
☐ 73-U1UCXCS
☐ 74-U1UCXCS
☐ 75-U1UCXCS
☐ 76-U1UCXCS
☐ 77-U1UCXCS
☐ 78-U2CTU
☐ 90-V2FAN
☐ 91-V2FAN
☐ 92-V2FAN
☐ 93-V2FAN

Current Performance DataHistory Performance DataUATPerformance Threshold-Crossing Record

Monitored Object Filter Criteria All

Monitor Period15-Minute24-Hour

MeasureCount

Performance Event TypeRS Out-of-Frame CountOptical data segment bit errorOptical Supervisory Channel Bit ErrorMS Bit Error(B2)Bit Error on the Optical Transport SectionAJ Pointer JustificationTU Pointer JustificationFEC PerformanceTCM PerformanceVC4 Path Error(B3)Other ErrorsSelect AllSelect None

Display OptionsDisplay Zero DataDisplay Continuous Severely Errored Seconds

Pre-defined rules

Monitored Object ^	Performance Event ^	Monitor Period	Start Time ^	Value MAX	Value CUR ^	Value MIN	
V O-Shelf0(GEMLIK-1-A)-1-12F... BDTEMPCUR(Celsius)	BDTEMPCUR(Celsius)	15-Minute	2026-05-14 21:00:00	32.40	32.40	32.40	Valid
V O-Shelf0(GEMLIK-1-A)-1-12F... SUMIOPCUR(dBm)	SUMIOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	6.50	6.50	6.50	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... BDTEMPCUR(Celsius)	BDTEMPCUR(Celsius)	15-Minute	2026-05-14 21:00:00	34.00	34.00	34.00	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... SUMIOPCUR(dBm)	SUMIOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	-0.30	-0.30	-0.30	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... SUMOOPCUR(dBm)	SUMOOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	12.70	12.70	12.70	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... SUMIOPCUR(dBm)	SUMIOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	-1.50	-1.50	-1.50	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... WCVCUR(mA)	WCVCUR(mA)	15-Minute	2026-05-14 21:00:00	574.00	574.00	573.00	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... CCVCUR(mA)	CCVCUR(mA)	15-Minute	2026-05-14 21:00:00	91.00	88.00	88.00	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... BCVCUR(uA)	BCVCUR(uA)	15-Minute	2026-05-14 21:00:00	22597.00	22529.00	22462.00	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... EDTMPCUR(Celsius)	EDTMPCUR(Celsius)	15-Minute	2026-05-14 21:00:00	26.00	25.90	25.50	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... SUMOOPCUR(dBm)	SUMOOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	18.40	18.40	18.40	Valid
V O-Shelf0(GEMLIK-1-A)-3-12O... EVOATTNCUR(dB)	EVOATTNCUR(dB)	15-Minute	2026-05-14 21:00:00	0.50	0.50	0.50	Valid
V O-Shelf0(GEMLIK-1-A)-4-13... BDTEMPCUR(Celsius)	BDTEMPCUR(Celsius)	15-Minute	2026-05-14 21:00:00	38.10	38.00	38.00	Valid
V O-Shelf0(GEMLIK-1-A)-4-13... ICTMPCUR(Celsius)	ICTMPCUR(Celsius)	15-Minute	2026-05-14 21:00:00	43.30	43.20	43.20	Valid
V O-Shelf0(GEMLIK-1-A)-4-13... SUMOOPCUR(dBm)	SUMOOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	0.20	0.20	0.20	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... BDTEMPCUR(Celsius)	BDTEMPCUR(Celsius)	15-Minute	2026-05-14 21:00:00	33.30	33.20	33.20	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSWLCUR(nm)	PCLSWLCUR(nm)	15-Minute	2026-05-14 21:00:00	1529.16	1529.16	1529.16	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSSNCUR(dB)	PCLSSNCUR(dB)	15-Minute	2026-05-14 21:00:00	-60.00	-60.00	-60.00	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSWLOCUR(nm)	PCLSWLOCUR(nm)	15-Minute	2026-05-14 21:00:00	0.00	0.00	0.00	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSOPCUR(dBm)	PCLSOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	-60.00	-60.00	-60.00	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSWLCUR(nm)	PCLSWLCUR(nm)	15-Minute	2026-05-14 21:00:00	1529.55	1529.55	1529.55	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSSNCUR(dB)	PCLSSNCUR(dB)	15-Minute	2026-05-14 21:00:00	-60.00	-60.00	-60.00	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSWLOCUR(nm)	PCLSWLOCUR(nm)	15-Minute	2026-05-14 21:00:00	0.00	0.00	0.00	Valid
V O-Shelf0(GEMLIK-1-A)-7-MC... PCLSOPCUR(dBm)	PCLSOPCUR(dBm)	15-Minute	2026-05-14 21:00:00	-60.00	-60.00	-60.00	Valid

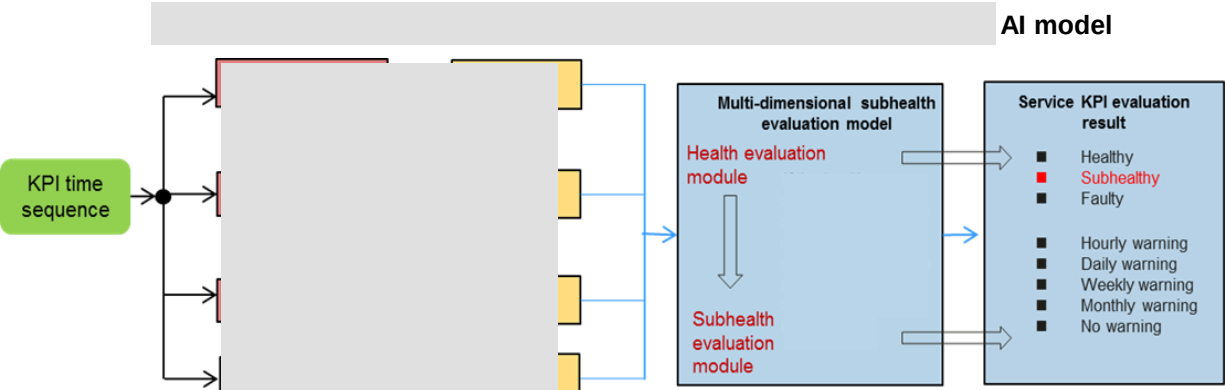
No. 0, Total: 2595, Selected: 0, Update at: 2026-05-14 21:02:31

Filter by TemplateQueryResetPrint



Fault prediction and risk identification: Line BER Fault (A)

For Line BER fault, the system provides real-time detection and analysis of risk and automatically generates accurate prediction and impact reports based on AI models.



The OCH performance(optical power/Q value etc.) is real-time collected and analyzed by the AI model.

Log example of the Model Inference

```
# ***** OCH PRE-FEC BER/Q Value Prediction Log Start *****

# ***** Q Value Data Preprocessing *****
2026-06-13 20:52:12.391 /usr_log.py:116 INFO : trigger_analyze_entry: data_len=700, train_window=672
2026-06-13 20:52:12.392 /usr_log.py:116 INFO : trigger_rule: cur_val=0.000000, cur_ber=0.000000
2026-06-13 20:52:12.392 /usr_log.py:116 INFO : trigger_rule: result_pre_alarm: time=2, confidence=95
2026-06-13 20:52:12.392 /usr_log.py:116 INFO : trigger_analyze: data sufficient, proceeding to algorithm prediction
2026-06-13 20:52:12.393 /usr_log.py:116 INFO : trigger_algorithm: data transformed, perform_value=len=672, last_val=14.248892, thr=15.559852

# ***** Q Value Data Smoothing / Denoising *****
2026-06-13 20:52:12.394 /usr_log.py:116 INFO : STL: calc_predict_value: entry: data_len=672, first=14.6137, last=14.2489
2026-06-13 20:52:12.409 /usr_log.py:116 INFO : smooth_value: noise_std=0.1424, glitches_fixed=44/672
2026-06-13 20:52:12.409 /usr_log.py:116 INFO : STL: smooth done, len=672

# ***** Step Change Detection *****
2026-06-13 20:52:12.420 /usr_log.py:116 INFO : get_test_step_index: no step found (returns 0), std=0.1169
2026-06-13 20:52:12.420 /usr_log.py:116 INFO : STL: step_index=0 (out of 672)
2026-06-13 20:52:12.425 /usr_log.py:116 INFO : smooth_value: noise_std=0.1300, glitches_fixed=47/672

# ***** FFT-based Period Detection *****
2026-06-13 20:52:12.436 /usr_log.py:116 INFO : get_amplitude_and_season_by_fft: max_amplitude=0.0541, max_index=0, map_season=224
2026-06-13 20:52:12.437 /usr_log.py:116 INFO : get_decomposition: result: FFT: max_amplitude=0.0541, map_season=224, trend_nan_count=0, seasonal_nan_count=0, max_error=0.2937
2026-06-13 20:52:12.437 /usr_log.py:116 INFO : STL: step for sawy: truncate to step_index=0, new_len=672
2026-06-13 20:52:12.446 /usr_log.py:116 INFO : smooth_value: noise_std=0.1300, glitches_fixed=47/672
2026-06-13 20:52:12.447 /usr_log.py:116 INFO : get_amplitude_and_season_by_fft: max_amplitude=0.0541, max_index=0, map_season=224

# ***** STL Decomposition (Trend + Seasonal + Residual) *****
2026-06-13 20:52:12.461 /usr_log.py:116 INFO : STL: decomposition: result: FFT: max_amplitude=0.0541, map_season=224, trend_nan_count=0, seasonal_nan_count=0, max_error=0.2937
2026-06-13 20:52:12.482 /usr_log.py:116 INFO : STL: decomposition done, map_season=224, trend_len=672, max_error=0.2937, real_view_window=648

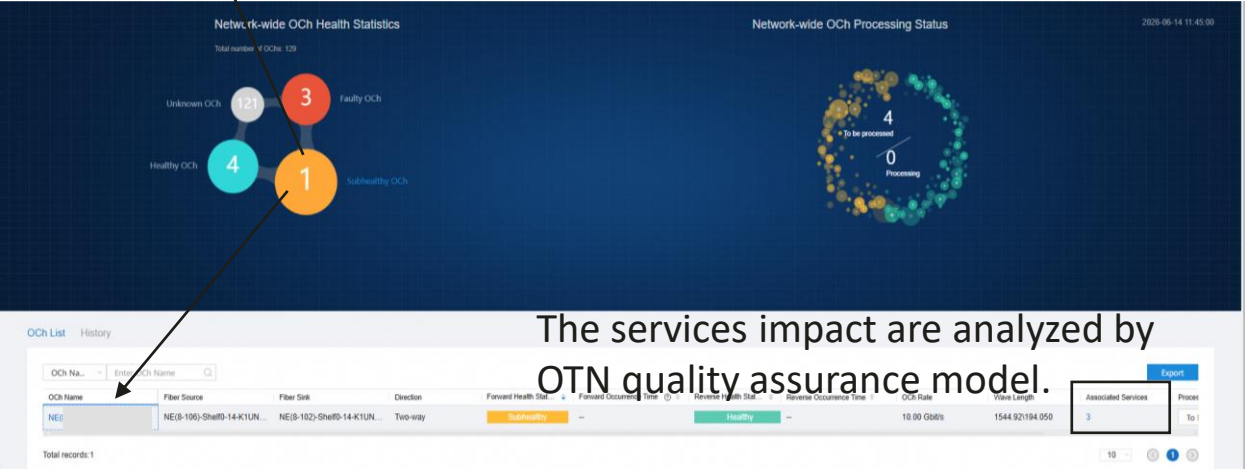
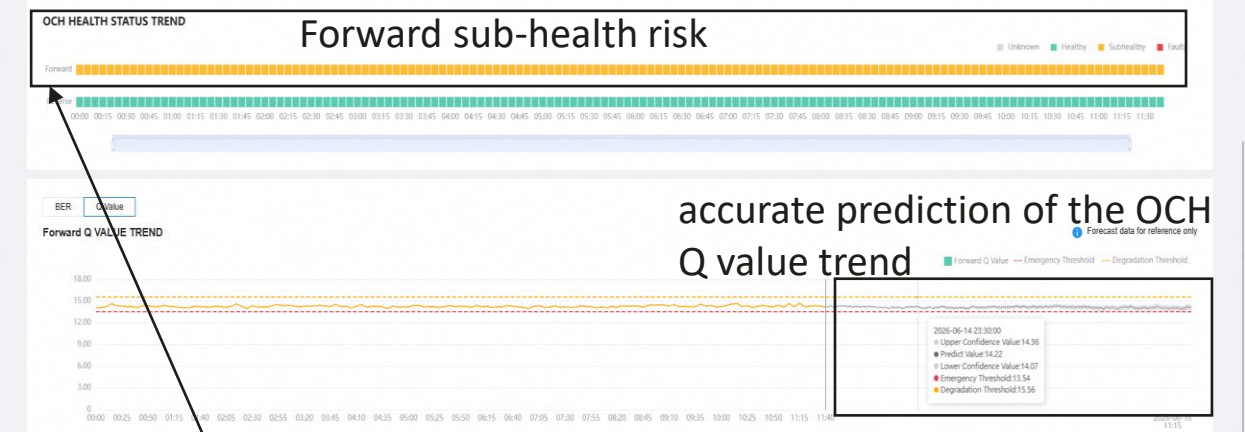
# ***** Generalized Linear Regression for Trend Prediction *****
2026-06-13 20:52:12.482 /usr_log.py:116 INFO : predict_tier_by_generalized_linear_model: linear: train_len=448, dir_input=96, predict_season=192
2026-06-13 20:52:12.486 /usr_log.py:116 INFO : predict_tier_by_generalized_linear_model: result[0]=14.5019, result[1]=14.4500
2026-06-13 20:52:12.596 /usr_log.py:116 INFO : calc_trend_predict_value: model=linear: train_len=448, slope=-0.0003, predict[0]=14.5019, predict[1]=14.4500, lower[0]=14.4500
2026-06-13 20:52:12.596 /usr_log.py:116 INFO : STL: trend_predict done, model=linear: predict_season=192, first_pred=14.5019, last_pred=14.4500
2026-06-13 20:52:12.598 /usr_log.py:116 INFO : STL: final result: upper[0]=14.2796, predict[0]=14.2689, lower[0]=14.2176
2026-06-13 20:52:12.598 /usr_log.py:116 INFO : trigger_algorithm: predict_value[0]=14.2689, 14.2511, 14.1690, 14.2400, 14.1456, 14.0565, 14.1355, 14.1870, 14.1779, 14.3793, 14.3450, 14.2633, 14.2729, 14.2323, 14.1372, 14.1849, 14.0039, 14.1049, 14.1145, 14.2867, 14.0366, 14.2316, 14.0948, 14.1059, 14.2615, 14.3381, 14.2888, 14.2874, 14.3191, 14.3574, 14.3379, 14.3546, 14.3544, 14.3013, 14.2968, 14.3716, 14.3685, 14.3641, 14.2099, 14.3597, 14.3336, 14.3653, 14.3434, 14.3306, 14.3295, 14.3265, 14.3496, 14.3015, 14.3386, 14.3816, 14.2784, 14.3450, 14.3483, 14.2987, 14.3176, 14.3763, 14.1340, 14.3937, 14.3412, 14.0313, 14.0852, 14.1731, 14.1713, 14.0471, 14.3102, 14.1421, 14.1643, 14.1776, 14.3844, 14.3810, 14.3413, 14.3487, 14.3323, 14.3330, 14.3399, 14.3140, 14.2791, 14.3611, 14.3068, 14.2969, 14.2738, 14.2869, 14.3062, 14.3174, 14.2863, 14.3349, 14.1464, 13.9177, 13.9366, 13.9210, 14.0042, 13.9537, 13.8888, 14.1799, 14.3174, 14.1303, 14.1069, 14.1704, 14.0665, 13.8274, 14.0345, 14.1586, 14.2480, 14.1004, 14.1178, 14.2472, 14.4772, 14.3636, 14.1592, 14.0261, 14.0277, 13.8971, 14.0353, 14.1626, 14.1705, 13.8703, 14.0795, 14.3446, 14.3409, 14.2581, 14.2737, 14.0824, 14.2601, 14.0251, 14.0356, 14.0687, 14.0783, 14.0731, 14.0639, 14.0225, 14.1181, 14.0898, 13.8298, 13.8243, 13.7604, 13.9650, 14.2465, 14.0394, 13.9686, 13.9866, 14.3592, 14.3666, 14.3645, 14.3546, 14.1237, 14.0897, 14.1004, 14.3801, 14.2181, 14.2271, 13.9794, 13.9847, 14.0767, 14.0301, 14.1438, 14.1474, 14.2164, 14.2840, 14.2776, 14.1100, 14.0394, 14.1142, 14.3412, 14.0945, 14.0344, 14.2289, 14.1386, 14.3532, 14.2072, 14.2917, 14.2917, 14.3324, 14.3302, 14.2945, 14.3360, 14.1478, 14.3320, 14.3120, 14.3152, 14.2822, 14.3533, 14.2893, 14.1412, 14.0955, 14.2278, 14.0694, 14.1224, 14.0393, 14.0898, 14.1584

# ***** Pre-Alarm Time Extraction & Confidence Calculation *****
2026-06-13 20:52:12.598 /usr_log.py:116 INFO : extract_pre_alarm_time: time=1376042, thr=15.559852, IMPORTANT
2026-06-13 20:52:12.599 /usr_log.py:116 INFO : calc_confidence: entry: upper_len=192, lower_len=192, thr=15.559852, cross_choose=1
2026-06-13 20:52:12.599 /usr_log.py:116 INFO : calc_confidence: doing: upper=67268, lower=67268, result=67268, confidence=100.00
2026-06-13 20:52:12.599 /usr_log.py:116 INFO : extract_confidence_pre_alarm_time: time=1, confidence=99.00
2026-06-13 20:52:12.612 /usr_log.py:116 INFO : trigger_algorithm: result: pre_alarm_time=1, confidence=99
2026-06-13 20:52:12.613 /usr_log.py:116 INFO : trigger_analyze: rule_result=Q.95, algorithm_result=1, 99
2026-06-13 20:52:12.613 /usr_log.py:116 INFO : trigger_analyze: result: pre_alarm_time=2, confidence=95

# ***** OCH PRE-FEC BER/Q Value Prediction Log End *****
```

Prediction result and a '99' confidence value is give out.

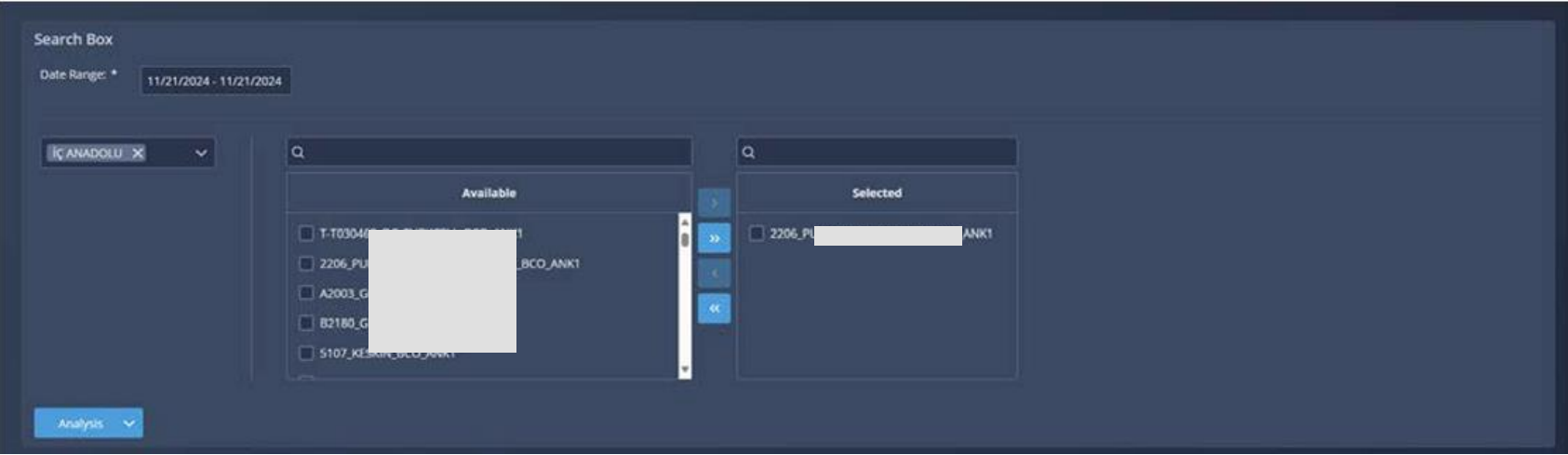
Then OCH's power sub-health risk is identified and the NMS gives a prediction when it becomes fault.



The services impact are analyzed by OTN quality assurance model.



Fault prediction and risk identification: Power & high temperature Fault (B)



The system support to monitor the temperature changes of the equipment in the selected field within the selected date range.



The temperature profile comparisons can be made via graph. Based on this analysis, the high temperature risk is predicted.



Fault identification & Impact analysis

Cognitive Activities	Service capability	Weight	Question	√ Option A	Option B	Option C	Option D
Analysis	Fault identification & Impact analysis	10%	How does the system support fault identification and impact analysis?	The system can automatically identify faults and subsequent impacts based on intelligent models, leveraging real-time multi-dimensional service (e.g. OTN Client, Eth over OTN, Eth over SDH, SDH) topology, timelines, and alarm correlations without human intervention.	The system can automatically identify faults, and subsequent impacts based on policies, leveraging physical topology, inventory data, timelines, and alarm correlations, and may need human confirmation.	The system identify faults and subsequent impacts based on pre-defined rules.	Faults and impact need to be manually identified based on human expertise or through the execution of manual written procedures.

Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
A	A	A	A	A	A

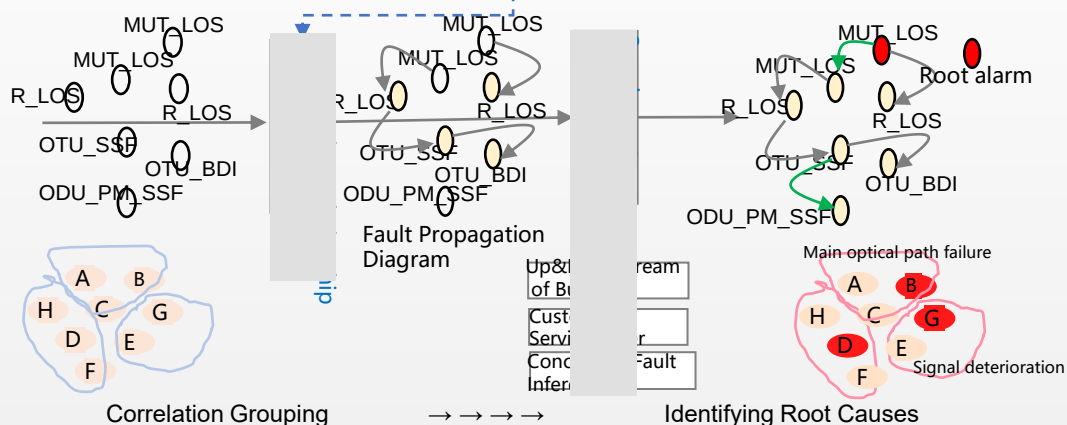


Evidence: Root Cause Alarm Identify and Services Impact Analysis Based on AI Models

Fault Propagation Graph Model

100+ in total, including 100+ experts and 100 algorithm mining

Alarm 1	Alarm 2	Source
MUT_LOS	MUT_LOS	Expert
MUT_LOS	R_LOS	Expert
R_LOS	OTU_SSF	Expert
OTU_SSF	OTU_BDI	Expert
RMT_DEV_POWER_OFF	MUT_LOS	Graph Neural Network



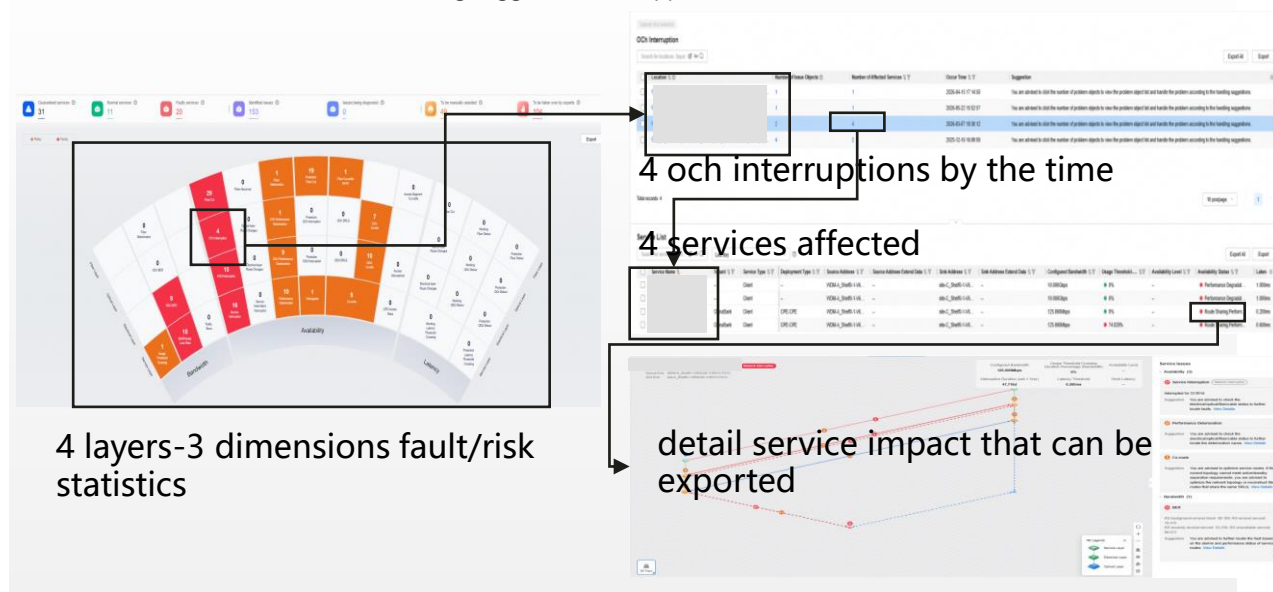
Root Cause Inference Log Example of Alarm Propagation Graph Model

```

##### Root Cause Identification Stage #####
2026-06-15 15:21:59.841 - [Identify-2] - INFO - iqs@gbg start root cause identification, pending alarm count: 11, incidentCn: T18105469151
2026-06-15 15:21:59.842 - [Identify-2] - INFO - iqs@gbg obtained root cause identification handler class [TopHandler]order=4, TopHandler[order=6]
2026-06-15 15:21:59.843 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] start processing, pending alarm count: 11
2026-06-15 15:21:59.843 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] start calculating propagation edge within NE[NE=16772264720-2113, alarm count: 5]
2026-06-15 15:21:59.854 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] propagateParam0 -> generated propagation edge MUT_LOS -> MUT_LOS (priority: 3)
2026-06-15 15:21:59.854 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] propagateParam0 -> generated propagation edge MUT_LOS -> OSC_LOS (priority: 2)
2026-06-15 15:21:59.860 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] NE[NE=16772647] propagation edge calculation completed, edge count: 4
2026-06-15 15:21:59.860 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] start calculating alarm priority, alarmName: MUT_LOS, alarm count: 4
2026-06-15 15:21:59.866 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] calcPriority -> alarm[779882]MUT_LOS [priority: 95, time weight: 30, propagation weight: 15]
2026-06-15 15:21:59.869 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] calcPriority -> alarm[779871]MUT_LOS [priority: 82, time weight: 25, propagation weight: 12]
2026-06-15 15:21:59.869 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] calcPriority -> alarm[779871]MUT_LOS [priority: 82, time weight: 25, propagation weight: 12]
##### Atomic Fault Subgraph Identification #####
2026-06-15 15:21:59.878 - [Identify-2] - INFO - iqs@gbg FindUtil - [PGI] start identifying subgraphs, node count: 7, edge count: 5
2026-06-15 15:21:59.883 - [Identify-2] - INFO - iqs@gbg FindUtil - [PGI] identified subgraph count: 2
2026-06-15 15:21:59.884 - [Identify-2] - INFO - iqs@gbg FindUtil - [PGI] subgraph1: node count=4, edge count=3, node=7[779882]MUT_LOS [priority: 95]
2026-06-15 15:21:59.887 - [Identify-2] - INFO - iqs@gbg FindUtil - [PGI] subgraph2: node count=4, edge count=1, node=7[779871]MUT_LOS [priority: 82]
2026-06-15 15:21:59.890 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] AtomFaultIdentification construction completed, instance count: 2
2026-06-15 15:21:59.893 - [Identify-2] - INFO - iqs@gbg DefaultAlarmIdentify - [ATCM] NE[NE=16772647] propagation edge calculation completed, edge count: 4
##### Cross-NE Complex Fault Identification #####
2026-06-15 15:21:59.893 - [Identify-2] - INFO - iqs@gbg DefaultCompIdentify - [COMPLEX] start cross-NE complex fault identification, atomic instance count: 2, topology path count: 24
2026-06-15 15:21:59.896 - [Identify-2] - INFO - iqs@gbg DefaultCompIdentify - [COMPLEX] cross-NE propagation rules loaded, rule count: 69, version: 20260601
2026-06-15 15:21:59.899 - [Identify-2] - INFO - iqs@gbg DefaultCompIdentify - [COMPLEX] apply topology path from atomic instance[Atom_01] to[Atom_02]
2026-06-15 15:21:59.900 - [Identify-2] - INFO - iqs@gbg DefaultCompIdentify - [COMPLEX] apply topology path from atomic instance[Atom_01] to[Atom_02]
2026-06-15 15:21:59.903 - [Identify-2] - INFO - iqs@gbg DefaultCompIdentify - [COMPLEX] matched cross-NE propagation rule: MUT_LOS -> AIS, ACTIVE
2026-06-15 15:21:59.908 - [Identify-2] - INFO - iqs@gbg DefaultCompIdentify - [COMPLEX] identified complex fault instance: Complex_01, containing atomic instances [Atom_01, Atom_02], priority: 88
2026-06-15 15:21:59.911 - [Identify-2] - INFO - iqs@gbg PIG filtering completed, retained alarm count: 1, filtered alarm count: 6
##### Root Cause Identification Handler 2: Topology Level Filtering #####
2026-06-15 15:21:59.918 - [Identify-2] - INFO - iqs@gbg RootCauseIdentify2/TopHandler start processing, pending alarm count: 5
2026-06-15 15:21:59.920 - [Identify-2] - INFO - iqs@gbg RootCauseIdentify2/TopHandler start processing, pending alarm count: 5
2026-06-15 15:21:59.925 - [Identify-2] - INFO - iqs@gbg topology level distribution [Level=0=1, Level=1=2, Level=2=2]
2026-06-15 15:21:59.932 - [Identify-2] - INFO - iqs@gbg select top level[Level=2] alarm [cn:779882, topology=1]
2026-06-15 15:21:59.939 - [Identify-2] - INFO - iqs@gbg Topology filtering completed, retained alarm count: 1
##### Root Cause Identification Handler 3: Trail Path Filtering #####
2026-06-15 15:21:59.953 - [Identify-2] - INFO - iqs@gbg load trail paths, path count: 12
2026-06-15 15:21:59.960 - [Identify-2] - INFO - iqs@gbg alarm=779882]MUT_LOS, 779884]PCV, 779885]CPW, 779886]CPW, 779887]CPW, 779888]CPW, 779889]CPW, 779890]CPW, 779891]CPW, 779892]CPW, 779893]CPW, 779894]CPW, 779895]CPW, 779896]CPW, 779897]CPW, 779898]CPW, 779899]CPW, 779900]CPW, 779901]CPW, 779902]CPW, 779903]CPW, 779904]CPW, 779905]CPW, 779906]CPW, 779907]CPW, 779908]CPW, 779909]CPW, 779910]CPW, 779911]CPW, 779912]CPW, 779913]CPW, 779914]CPW, 779915]CPW, 779916]CPW, 779917]CPW, 779918]CPW, 779919]CPW, 779920]CPW, 779921]CPW, 779922]CPW, 779923]CPW, 779924]CPW, 779925]CPW, 779926]CPW, 779927]CPW, 779928]CPW, 779929]CPW, 779930]CPW, 779931]CPW, 779932]CPW, 779933]CPW, 779934]CPW, 779935]CPW, 779936]CPW, 779937]CPW, 779938]CPW, 779939]CPW, 779940]CPW, 779941]CPW, 779942]CPW, 779943]CPW, 779944]CPW, 779945]CPW, 779946]CPW, 779947]CPW, 779948]CPW, 779949]CPW, 779950]CPW, 779951]CPW, 779952]CPW, 779953]CPW, 779954]CPW, 779955]CPW, 779956]CPW, 779957]CPW, 779958]CPW, 779959]CPW, 779960]CPW, 779961]CPW, 779962]CPW, 779963]CPW, 779964]CPW, 779965]CPW, 779966]CPW, 779967]CPW, 779968]CPW, 779969]CPW, 779970]CPW, 779971]CPW, 779972]CPW, 779973]CPW, 779974]CPW, 779975]CPW, 779976]CPW, 779977]CPW, 779978]CPW, 779979]CPW, 779980]CPW, 779981]CPW, 779982]CPW, 779983]CPW, 779984]CPW, 779985]CPW, 779986]CPW, 779987]CPW, 779988]CPW, 779989]CPW, 779990]CPW, 779991]CPW, 779992]CPW, 779993]CPW, 779994]CPW, 779995]CPW, 779996]CPW, 779997]CPW, 779998]CPW, 779999]CPW, 780000]CPW, 780001]CPW, 780002]CPW, 780003]CPW, 780004]CPW, 780005]CPW, 780006]CPW, 780007]CPW, 780008]CPW, 780009]CPW, 780010]CPW, 780011]CPW, 780012]CPW, 780013]CPW, 780014]CPW, 780015]CPW, 780016]CPW, 780017]CPW, 780018]CPW, 780019]CPW, 780020]CPW, 780021]CPW, 780022]CPW, 780023]CPW, 780024]CPW, 780025]CPW, 780026]CPW, 780027]CPW, 780028]CPW, 780029]CPW, 780030]CPW, 780031]CPW, 780032]CPW, 780033]CPW, 780034]CPW, 780035]CPW, 780036]CPW, 780037]CPW, 780038]CPW, 780039]CPW, 780040]CPW, 780041]CPW, 780042]CPW, 780043]CPW, 780044]CPW, 780045]CPW, 780046]CPW, 780047]CPW, 780048]CPW, 780049]CPW, 780050]CPW, 780051]CPW, 780052]CPW, 780053]CPW, 780054]CPW, 780055]CPW, 780056]CPW, 780057]CPW, 780058]CPW, 780059]CPW, 780060]CPW, 780061]CPW
```

OTN quality assurance Model

Four layers-three dimensions service impact analysis, Each type of indicators provides the current status, fault/risk cause, and handling suggestions to support SLA assurance.



The system generates service impact analysis by the quality assurance model, for example:

One co-cable risk is automatically detected.

```
2026-04-23 04:00:55,222 WARN [synchronize][asyncTaskPool-35743-synchronize][[ch.s.cs.CoCableService 134] processCoCableResult addGroupInfo=[SlafiberGroupInfo(id=1348, processType=0, aFiberUid=11202e70-4ade-4934-8981-0c3720e75d4d, bFiberUid=5e149f09-db76-46f1-a04a-c57da4eb4fa0, aFiberFullName=FiBER Name:[f-15],Source Port:[VITRO1-HSAPS-001-NCR1794]-[Shelf1-4-11SIU-1(TO MANDA)]),Sink Port:[(PARCRO-HSA V-004-NCR435)-[Shelf0-1-F1DSFIU-4(ELINE1/ELINE2 FAC VITRO)]),bFiberFullName=FiBER Name:[f-3],Source Port:[(GTPIO2-HSPUS-001-NCR520)-[Shelf1-8-11SIU-1(LINE1/LINE2)]),Sink Port:[(PARCRO-HSA V-004-NCR435)-[Shelf0-1-F1DSFIU-1(WLINE1/WLINE2 FAC GTPIO2)]), riskLevel=0, endTime=null, exceptionReason=null, aSrcDistance=2.4, bSrcDistance=1.5, cableEnableStatus=1],SlafiberGroupInfo(id=539, processType=0, aFiberUid=14c7c086-13aa-4882-a30c-8105b856bd18, bFiberUid=5e149f09-db76-46f1-a04a-c57da4eb4fa0, aFiberFullName=FiBER Name:[GTPIO2-HSPUS-001-NCR520-f-158],Source Port:[(GTPIO2-HSPUS-001-NCR520)-[Shelf0-6-11SIU-1(LINE1/LINE2)]),Sink Port:[VITRO1-HSAPS-001-NCR1794]-[Shelf0-6-11SIU-1(TO PARC ROYAL)]),bFiberFullName=FiBER Name:[f-3],Source Port:[(GTPIO2-HSPUS-001-NCR520)-[Shelf1-8-11SIU-1(LINE1/LINE2)]),Sink Port:[(PARCRO-HSA V-004-NCR435)-[Shelf0-1-F1DSFIU-1(WLINE1/WLINE2 FAC GTPIO2)]), riskLevel=0, endTime=null, exceptionReason=null, aSrcDistance=2.4, bSrcDistance=1.5, cableDistance=3.0, licenseEnableStatus=1]
```

The quality assurance model matches out all OTN trail related to the co-cable fibers.

Root cause identified and 1.0 probability is scored.

Fault identification & Impact analysis: Board/Module Fault (A)

For board/module fault, the system automatically identify faults and subsequent services impacts leveraging real-time multi-dimensional service topology, timelines, and alarm correlations.

The analysis result is used in below “Intelligent Incident Management” feature, “Quality Assurance” feature, open API etc.

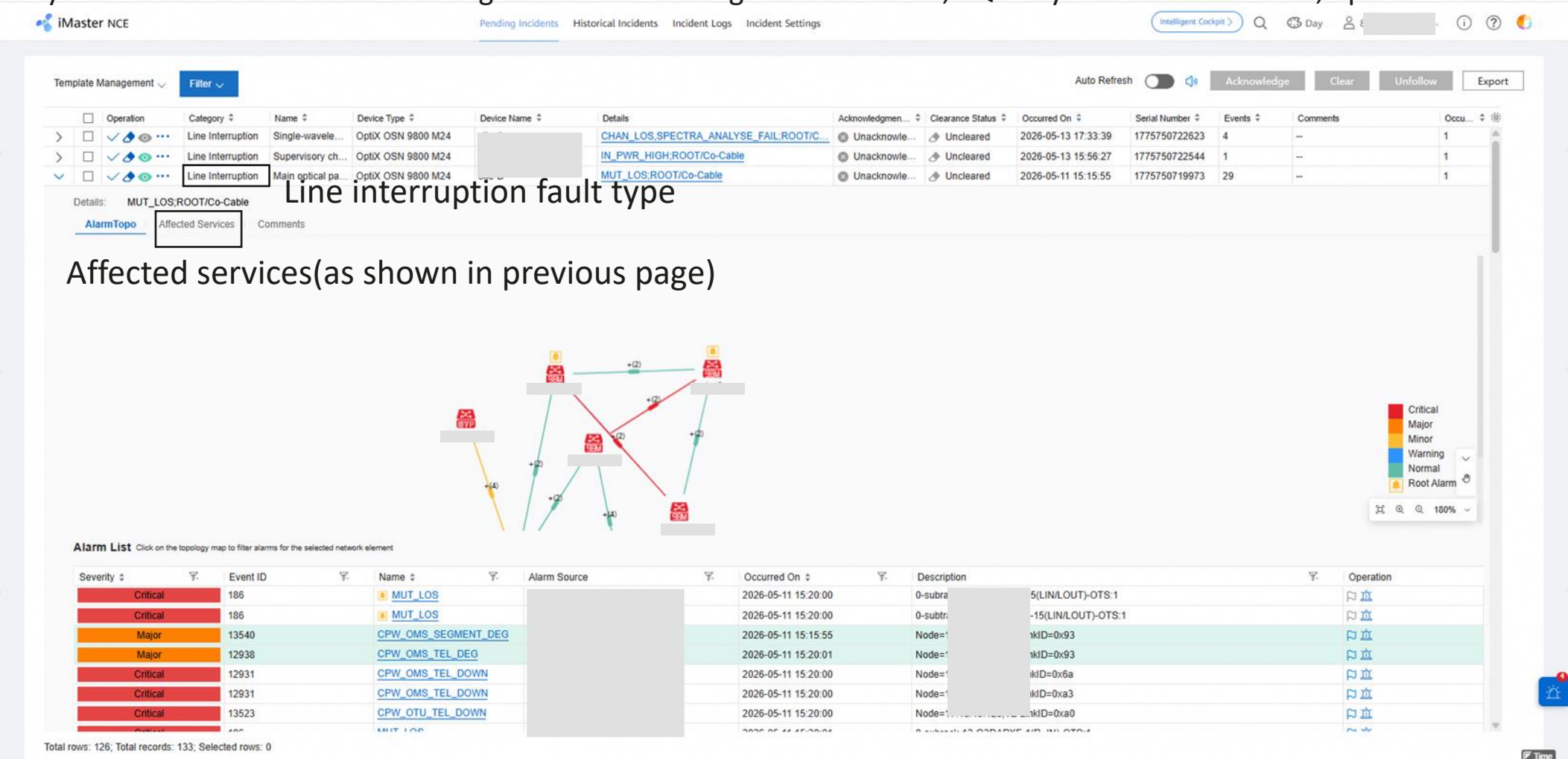
The screenshot displays the iMaster NCE interface. At the top, there are navigation tabs: Pending Incidents, Historical Incidents, Incident Logs, Incident Overview, and Incident Settings. The 'Pending Incidents' tab is active. Below the navigation bar, there's a search bar and a 'Filter' button. The main area shows a table of incidents. Two incidents are visible, both categorized as 'Device Hardware' with the name 'Optical module fault'. The first incident occurred on 2026-05-13 14:50:23, and the second on 2026-05-13 13:35:45. Both incidents are associated with the device 'OptiX OSN 9800 M12'. Below the incident table, there's a 'Details' section for the selected incident, showing the alarm path 'LASER_SHUT_R_LOS:ROOT/VFMOBILE/SUBNET-1_OYMAPINAR_MEDYAPARK_SANLIURFA'. To the right of the incident table, there's a text overlay: 'Board/Module fault type'. Below the details section, there's a table titled 'Affected Services'. This table has columns for 'Name', 'Level', 'Source', 'Sink', 'Customer', and 'Remarks'. The table lists 10 services, all of which are 'CLIENT' level. The 'Customer' column shows values like 77, 91, 74, 65, 98, and 86. The 'Remarks' column contains the text 'STB181 bu devrenin yedekidir.' (STB181 is a spare of this device). At the bottom of the page, there's a 'Total records: 45' label and a pagination bar showing '10' records per page and page numbers '1', '2', '3', '4', '5'.



Fault identification & Impact analysis: Line Interruption Fault (A)

For line interruption fault, the system automatically identify faults and subsequent services impacts leveraging real-time multi-dimensional service topology, timelines, and alarm correlations.

The analysis result is used in below “Intelligent Incident Management” feature, “Quality Assurance” feature, open API etc.



Fault identification & Impact analysis: Optical Power Fault (A)

For optical power fault, the system automatically identify faults and subsequent services impacts leveraging real-time multi-dimensional service topology, timelines, and alarm correlations.

The analysis result is used in below “Intelligent Incident Management” feature, “Quality Assurance” feature, open API etc.

iMaster NCE

Pending Incidents | Historical Incidents | Incident Logs | Incident Settings

Intelligent Cockpit > 🔍 🌞 Day 👤 ⓘ ? 🌐

Template Management ▾ Filter ▾

Auto Refresh ☐ 🔊 Acknowledge Clear Unfollow Export

☐	Operation	Category	Name	Device Type	Device Name	Details	Acknowledgment	Clearance Status	Occurred On	Serial Number	Events	Comments	Occur...
>	☒	Optical Power	Single-wave...	OptiXtrans E9612	[REDACTED]	IN_PWR_LOW,ROO...	Unacknowle...	Uncleared	2026-05-13 13:42:07	177...2469	1	--	2
>	☒	Optical Power	Single-wave...	OptiXtrans E9612	[REDACTED]	IN_PWR_LOW,ROO...	Unacknowle...	Uncleared	2026-04-29 09:59:10	177...2470	1	--	1
>	☒	Optical Power	Single-wave...	OptiX OSN 1800 V	[REDACTED]	IN_PWR_LOW,ROO...	Unacknowle...	Uncleared	2026-04-16 17:06:41	177...0211	1	--	1
>	☒	Optical Power	Single-wave...	OptiX OSN 9800 U16	[REDACTED]	IN_PWR_LOW,RX_P...	Unacknowle...	Uncleared	2026-04-15 17:31:12	177...9862	2	--	1
>	☒	Optical Power	Main optical po...	OptiX OSN 9800	[REDACTED]	SUM_INPWR_LOW,C...	Unacknowle...	Uncleared	2026-03-26 19:47:15	177...5029	18	--	2
▾	☒	Optical Power	Main optical po...	OptiX OSN 9800 M24	[REDACTED]	SPAN_LOSS_UPPER...	Unacknowle...	Uncleared	2026-03-26 11:04:16	177...34277	7	--	1

Details: SPAN_LOSS_UPPER_GAIN, SPAN_LOSS_EXCEED_EOL Optical Power Jitter Alarm, ROOT/Co-Cable

AlarmTopo Affected Services Comments

Affected services as previous page.

Alarm List Click on the topology map to filter alarms for the selected network element

Severity	Event ID	Name	Alarm Source	Occurred On	Description	Operation
Major	71293	Optical Power Jitter Alarm	[REDACTED]	2026-03-26 11:04:16	port=s...1(R_IN)-OTS=1	🔖 ⚙️
Major	13629	SPAN_LOSS_EXCEED_E...	[REDACTED]	2026-03-26 11:05:13	0-subr...	🔖 ⚙️
Minor	13649	SPAN_LOSS_UPPER_GAI...	[REDACTED]	2026-03-26 11:05:01	0-subr...	🔖 ⚙️
Major	13540	CPW_OMS_SEGMENT_DEG...	[REDACTED]	2026-03-26 11:05:09	Node=...	🔖 ⚙️

Total rows: 21; Total records: 23; Selected rows: 0



Fault identification & Impact analysis: Client Side Fault (A)

For client side fault, the system automatically identify faults and subsequent services impacts leveraging real-time multi-dimensional service topology, timelines, and alarm correlations.

The analysis result is used in below “Intelligent Incident Management” feature, “Quality Assurance” feature, open API etc.

The screenshot displays the iMaster NCE interface with the following components:

- Top Navigation Bar:** Includes the iMaster NCE logo, navigation tabs (Pending Incidents, Historical Incidents, Incident Logs, Incident Overview, Incident Settings), and user controls (Intelligent Cockpit, search, Day, user profile, and help icons).
- Incident List Table:** A table with columns: Operation, Events, Serial Number, Occurred On, Created On, Cleared On, Category, Name, Device Type, Device Name, and Details. It lists multiple incidents, with the last one highlighted by a red box.
- Incident Details Section:**
 - Details:** Shows the incident path: ALM_DATA_RLOS,ALM_DATA_TLOS,ROOT/VFMOBILE/SUBNET-10_AVRUPA.
 - AlarmTopo:** Includes tabs for Affected Services and Comments.
 - Service Name Input:** A field labeled "Enter a service name" with a search icon.
 - Affected Services Table:** A table with columns: Name, Level, Source, Sink, Customer, and Remarks. It contains one entry: (SI...)_w... CLIENT E: ... I: ...
 - Total records:** Displays "Total records: 1".
- Bottom Table:** A continuation of the incident list table, showing additional incidents.



Fault identification & Impact analysis: Line BER Fault (A)

For line BER fault, the system automatically identify faults and subsequent services impacts leveraging real-time multi-dimensional service topology, timelines, and alarm correlations.

The analysis result is used in below “Intelligent Incident Management” feature, “Quality Assurance” feature, open API etc.

Template Management

Filter

Auto Refresh

Acknowledge

Clear

Unfollow

Export

Operation	Events	Serial Number	Occurred On	Created On	Cleared On	Category	Name	Device Type	Device Name	Details	
> ☐ ☒ ☐ ☐ ☐	4	17	3	2026-05-13 15:23:39	2026-05-13 15:25:41	2026-05-13 1...	Line Degrade	Line signal deteriorat...	OptiX OSN 1800	C	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	1	17	38	2026-05-13 15:23:20	2026-05-13 15:25:20	2026-05-13 1...	Line Degrade	Line signal deteriorat...	OptiX OSN 1800	T	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	2	17	32	2026-05-13 15:20:25	2026-05-13 15:22:23	--	Line Degrade	Line signal failure	OptiX OSN 6800	E	R_LOF;ROOT/VFMOBILE/SUBNE
> ☐ ☒ ☐ ☐ ☐	1	17	31	2026-05-13 15:16:25	2026-05-13 15:18:26	2026-05-13 1...	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 M24	T	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	8	17	34	2026-05-13 14:43:48	2026-05-13 14:45:50	2026-05-13 1...	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 U32	P	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	2	17	37	2026-05-13 14:09:37	2026-05-13 15:19:50	--	Line Degrade	Line signal failure	OptiX OSN 9800 M24	H	ODU2_PM_SSF;ROOT/VFMOBI
> ☐ ☒ ☐ ☐ ☐	1	17	37	2026-05-13 12:11:22	2026-05-13 12:13:23	--	Line Degrade	Line signal failure	OptiX OSN 1800	G	OPU2_CSF;ROOT/VFMOBILE/SL
> ☐ ☒ ☐ ☐ ☐	13	17	32	2026-05-13 08:42:50	2026-05-13 08:44:47	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 U32	P	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	4	17	34	2026-05-13 06:47:45	2026-05-13 06:49:44	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 M24	T	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	11	17	33	2026-05-12 18:08:34	2026-05-12 18:10:38	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 M24	T	BEFFEC_EXC;ROOT/VFMOBILE

Details: BEFFEC_EXC;ROOT/VFMOBILE/SUBNET-4_KESAN_GAZIEMIR

AlarmTopo

Affected Services

Comments

Enter a service name

Affected service

Name %	Level %	Source %	Sink %	Customer	Remarks
%A]	CLIENT	T-1	G; %T-1	77	

Total records: 1

10 1

> ☐ ☒ ☐ ☐ ☐	2	17	34	2026-05-12 17:10:44	2026-05-12 17:12:44	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 M24	T	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	15	17	39	2026-05-12 14:09:43	2026-05-12 14:11:41	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 M24	M	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	18	17	35	2026-05-12 13:28:08	2026-05-12 13:33:11	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 M24	T	BEFFEC_EXC;ROOT/VFMOBILE
> ☐ ☒ ☐ ☐ ☐	13	17	38	2026-05-12 13:06:41	2026-05-12 13:08:44	--	Line Degrade	Line signal deteriorat...	OptiX OSN 9800 U32	M	BEFFEC_EXC;ROOT/VFMOBILE



Fault identification & Impact analysis: Power & high temperature Fault (A)

For power & high temperature fault, the system automatically identify faults and services impacts leveraging real-time multi-dimensional service topology, timelines, and alarm correlations.

The analysis result is used in below “Intelligent Incident Management” feature, “Quality Assurance” feature, open API etc.

☐	Operation	Category	Name	Device Type	Device Name	Details	Acknowledgment	Clearance Status	Occurred On	Serial Number	Events	Comments	Occu...
>	☐	   ...	Power Environ...	Device temper...	OptiX OSN 9800 U16	TEMP_OVER;ROOT/HDF-187-PHY	 Unacknowle...	 Uncleared	2026-04-22 23:29:08	1	2	--	1
>	☐	   ...	Power Environ...	Device temper...	OptiX OSN 9800 M24	AMBIENT_TEMP_OVER;DEV_BASE_DATA_DIF...	 Unacknowle...	 Uncleared	2026-03-02 17:52:56	1	2	--	1
>	☐	   ...	Power Environ...	Device temper...	OptiX OSN 9800 M24	AMBIENT_TEMP_OVER;TEMP_OVER;ROOT/A...	 Unacknowle...	 Uncleared	2026-02-06 16:28:36	1	11	--	1
✓	☐	   ...	Power Environ...	Device temper...	OptiX OSN 9800 M24	AMBIENT_TEMP_OVER;TEMP_OVER;ROOT/A...	 Unacknowle...	 Uncleared	2026-02-06 16:26:32	1	11	--	1

Power & high temperature fault type

Details: AMBIENT TEMP OVER TEMP OVER:ROOT/ASON

AlarmTopo

Affected Services

Comments

Affected services(as shown in previous page)



A screenshot of the status bar area showing the 'Root Alarm' icon, which is a yellow bell icon, and a legend for alarm levels: Critical (red), Major (orange), Minor (yellow), Warning (blue), Normal (green), and Root Alarm (yellow bell icon).

Alarm List Click on the topology map to filter alarms for the selected network element

Severity	Event ID	Name	Alarm Source	Occurred On	Description	Operation	
Major	13670	 AMBIENT_TEMP_OVER		2026-02-06 16:27:25	0-subr	 	
Major	14744	 DEV_BASE_DATA_DIFF		2026-02-06 16:28:34	0-subr	OTHER	 
Major	12303	 SUBRACK_ID_MISMATCH		2026-02-06 16:26:32	0-subr	OTHER	 
Major	28	 TEMP_OVER		2026-02-06 16:26:33	0-subr	OTHER	 
Major	28	 TEMP_OVER		2026-02-06 16:26:32	0-subr	OTHER	 
Major	28	 TEMP_OVER		2026-02-06 16:26:32	0-subr	OTHER	 



Fault Demarcation & Locating

Cognitive Activities	Service capability	Weight	Question	√ Option A	√ Option B	Option C	Option D
Analysis	Fault Demarcation & Locating	20%	How does the system support fault demarcation and root cause locating?	The system automatically demarcates the faults and locates the single root cause based on intelligent models, without manual intervention. Examples of single root causes include the smallest replaceable units, such as faulty slots, optical modules, fiber fault locations, etc.	The system automatically demarcates the faults and locates the unique problem category (e.g. Optical Module, Fiber, Port) based on policies, and may need human confirmation.	The system automatically demarcates and locates faults based on pre-defined rules and needs manual confirmation.	Fault diagnosis needs to be manually performed based on expertise.

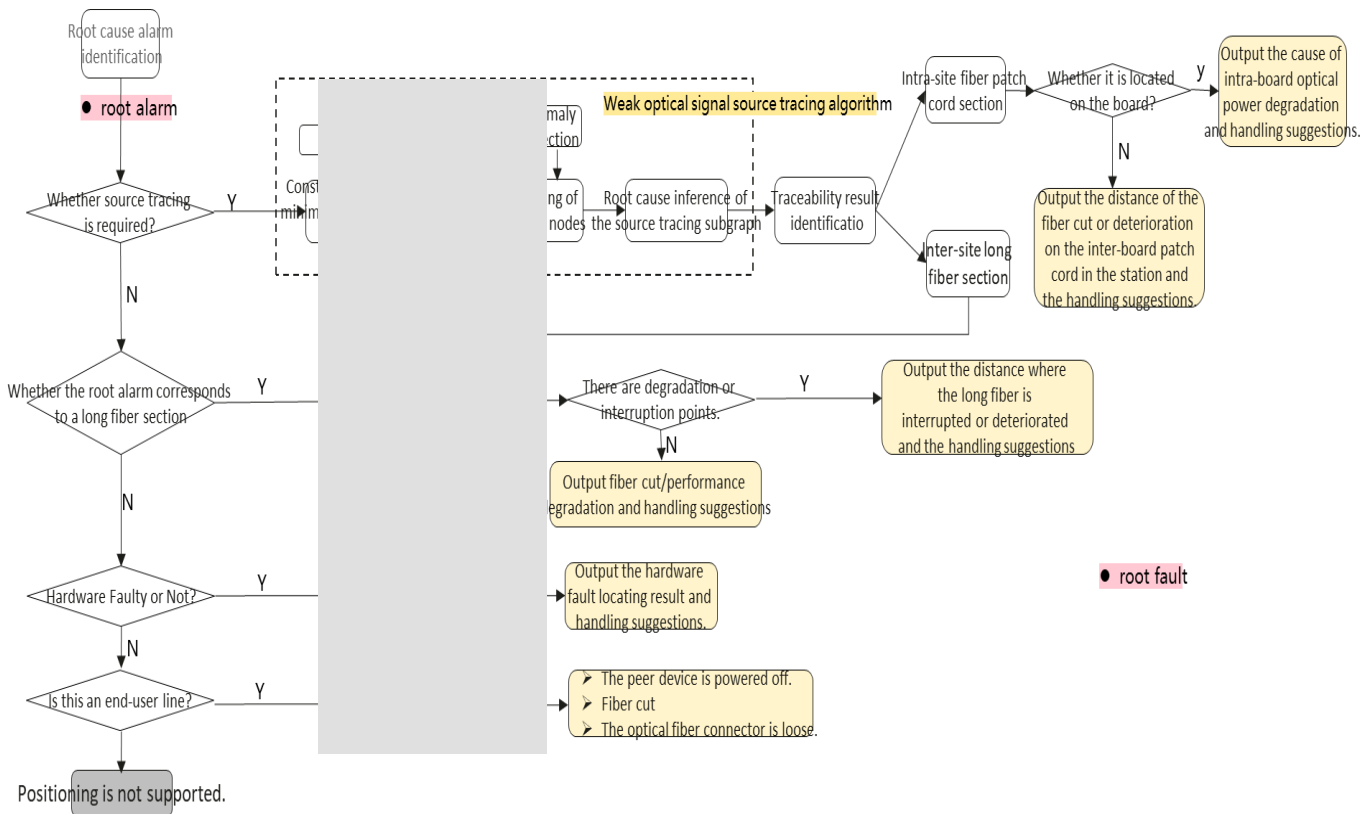
Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
A	A	A	B	A	A



Evidence: Intelligent Fault Diagnosis Based on OTN fault tree AI model

OTN fault tree Model

The fault tree model is generated utilizing Natural Language Processing technology to extract fault causes from a large number of product manuals and equipment maintenance experiences. It serves as the foundation of intelligent fault diagnosis system.



OTN root alarm is automatically diagnosed to root fault based on the model.

Root fault Inference Log Example of OTN fault tree Model

[illegible]

Optical power abnormal root fault is located at a specific OTS fiber

Fault Demarcation & Locating: Line Interruption Fault (A)

For line interruption fault, the system automatically demarcates the faults and locates the single root cause based on intelligent models, without manual intervention.

>

☐

☒

☒

☒

70

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

10

17

>

☐

☒

☒

☒

2

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

2

17

>

☐

☒

☒

☒

2

17

>

☐

☒

☒

☒

18

17

>

☐

☒

☒

☒

4

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

4

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

2

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

1

17

>

☒

☒

☒

☒

2

17

>

☐

☒

☒

☒

1

17

>

☐

☒

☒

☒

470

17

2026-05-13 15:17:17

2026-05-13 15:19:20

--

Line Interruption

Main optical path i...

OptiX OSN 9800 M12

Details

Incident Information

Device Name/Serial Number

RAM1

0295

Occurrence Time

2026-05-13 15:07:03

Incident Name

Single-wavelength optical path interruption

Incident Details

R_LOS;ROOT/VFMOBILE/SUBNET-10_AVRUPA

Diagnosis Status

Diagnosis Result

Diagnosis succeeded.

Diagnosis Time

2026-05-13 15:11:11

Diagnosis Details

1. The inter-site optical path is interrupted, and the sink port cannot receive optical signals. Source port: R Shelf0-5-F2ELOM-1(IN1/OUT1 (7dB)); sink port: MG1 Shelf1-11-130BU1-1(IN_DCM(s)/L2.3dB_VI/VO:17_FO_01V000015614) ; 2. The transmit power of port Shelf0-22-55NO2-2(IN2/OUT2) on NE MGH8801_S10_E is abnormal

demarcates the faults and locates the single root cause: inter-site optical path is interrupted.

Top

Details

Performance

Diagram

Close



Fault Demarcation & Locating: Optical Power Fault (A)

For optical power fault, the system automatically demarcates the faults and locates the single root cause based on intelligent models, without manual intervention.

Details

Incident Information

Device Name/Serial Number: D1-3331 Occurrence Time: 2026-05-12 15:14:21

Incident Name: Single-wavelength optical power fault Incident Details: IN_PWR_LOW,OMS_PWR_ADJ_FAIL,ROOT/VFMOBILE/SUBNET.2_KAYSERI_HARPUT_DIYARBAKIR_SANLIURFA_ERZURUM

Diagnosis Status

Diagnosis Result: Diagnosis succeeded.

Diagnosis Time: 2026-05-12 15:19:26

Diagnosis Details: The internal optical path of the NE is degraded, and the optical signal quality at the sink port gradually decreased by 0.60 dB. Source port: D1-Shelf0-16-120BU1-2(OUT); sink port: D1-Shelf1-13-12D40-1(IN).

Suggestions: Check whether the fiber patch cord, board, or module involved in the optical path on the NE is faulty.

demarcates the faults and locates the single root cause: signal quality at the sink port gradually decreased.



Fault Demarcation & Locating: Client Side Fault (B)

For client side fault, the system automatically demarcates the faults and locates the unique problem category based on policies, and may need human confirmation.

iMaster NCE

Pending Incidents

Historical Incidents

Incident Logs

Incident Overview

Incident Settings

Intelligent Cockpit

Q

Day

Incidents Generated ...

Filter

Auto Refresh

Acknowledge

Clear

Unfollow

Export

	Operation	Events	Serial Number	Occurred On	Created On	Cleared On	Category	Name	Device Type	Device Name	Details
>	☐ ☒ ☒ ☒	2	1777391	2026-05-13 15:31:49	2026-05-13 15:33:47	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	IT...	Idle port incident;ALM_DATA_RLC
>	☐ ☒ ☒ ☒	2	1777380	2026-05-13 15:26:04	2026-05-13 15:27:59	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	S...	ALM_DATA_RLOS;ALM_DATA_TI
>	☐ ☒ ☒ ☒	2	1777374	2026-05-13 15:23:57	2026-05-13 15:25:56	--	Client-Side	Client-side line fault	OptiX OSN 9800 U32	T...	Idle port incident;R_LOS;ROOT/V
>	☐ ☒ ☒ ☒	2	1777375	2026-05-13 15:23:56	2026-05-13 15:25:56	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	A...	Idle port incident;LOCAL_FAULT.F
>	☐ ☒ ☒ ☒	1	1777330	2026-05-13 15:12:08	2026-05-13 15:14:08	--	Client-Side	Client-side line fault	OptiX OSN 8800 T32	A...	REM_SF;ROOT/VFMOBILE/SUBN
>	☐ ☒ ☒ ☒	2	1777328	2026-05-13 15:10:34	2026-05-13 15:12:32	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	IT...	Idle port incident;ALM_DATA_RLC
>	☐ ☒ ☒ ☒	2	1777284	2026-05-13 15:02:44	2026-05-13 15:04:44	--	Client-Side	Client-side line fault	OptiX OSN 9800 U32	T...	Idle port incident;R_LOS;ROOT/V
>	☐ ☒ ☒ ☒	2	1777283	2026-05-13 15:02:42	2026-05-13 15:04:44	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	IT...	Idle port incident;LOCAL_FAULT.F
>	☐ ☒ ☒ ☒	2	1777227	2026-05-13 14:40:48	2026-05-13 14:42:47	--	Client-Side	Client-side line fault	OptiX OSN 9800 U32	T...	Idle port incident;R_LOS;ROOT/V
>	☐ ☒ ☒ ☒	2	1777228	2026-05-13 14:40:46	2026-05-13 14:42:47	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	IT...	Idle port incident;LOCAL_FAULT.F
>	☐ ☒ ☒ ☒	4	1777190	2026-05-13 14:17:27	2026-05-13 14:19:26	--	Client-Side	Client-side line fault	OptiX OSN 9800 U32	E...	ALM_DATA_RLOS;ALM_DATA_TI

Details: ALM_DATA_RLOS;ALM_DATA_TLOS;ROOT/VFMOBILE/SUBNET-10_AVRUA

AlarmTopo

Affected Services

Comments

Enter a service name

Name %1

(SIB3)

...

CLIENT

E:

NT-1

ITR9

99)))-CLIENT-1

Customer

Remarks

Total records: 1

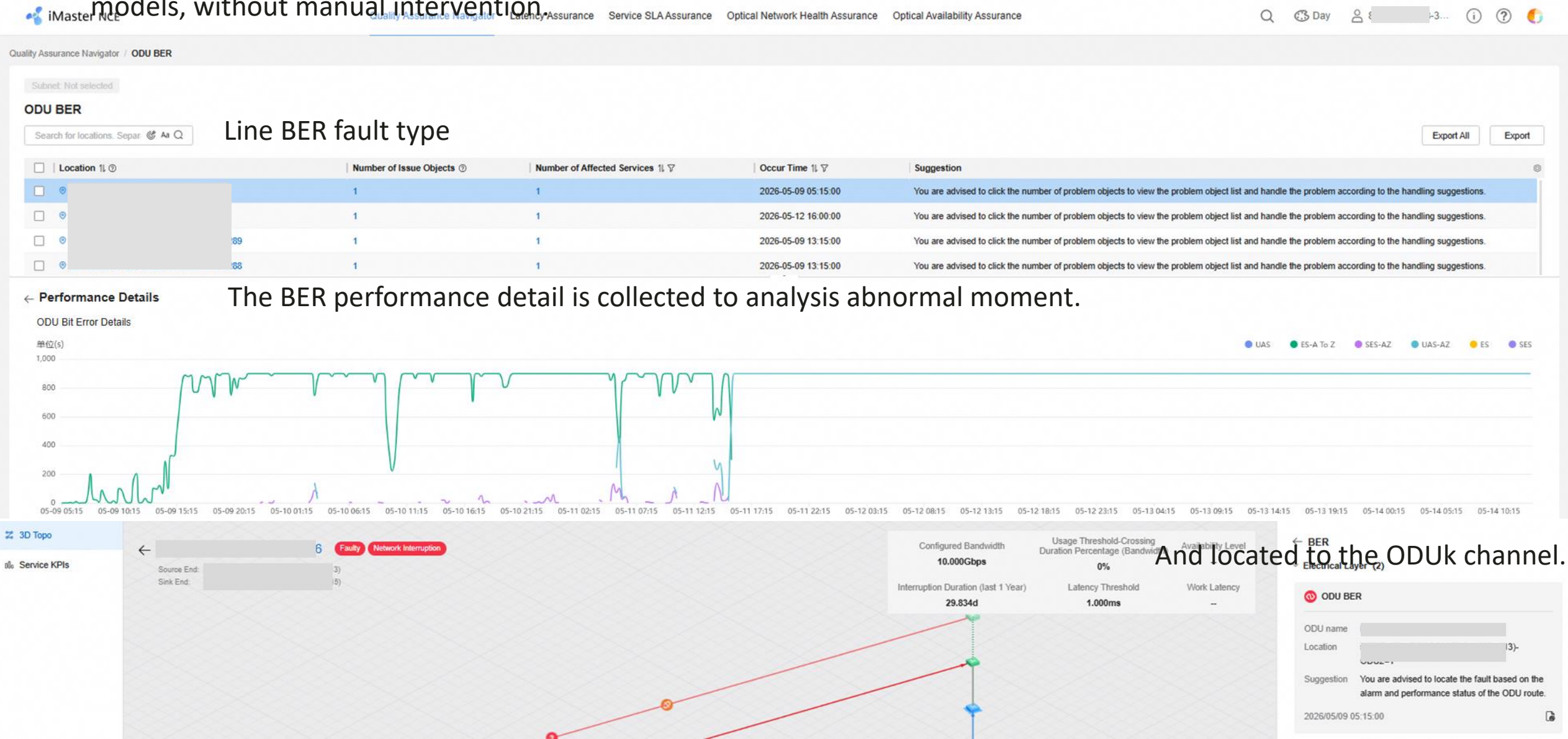
Client side fault type

Some client side fault locating needs human confirmation, for example:in router connecting to WDM client side scenario, when no services are running, the router periodically sends some ARP packets and the WDM client board will report ALM_DATA_TLOS and ALM_DATA_RLOS alarms. These are user-defined warning alarms for the data board and can be masked by policies.

>	☐ ☒ ☒ ☒	2	1777386	2026-05-13 14:08:38	2026-05-13 14:10:38	--	Client-Side	Client-side line fault	OptiX OSN 9800 U32	AT...	ALM_DATA_RLOS;ALM_DATA_TI
>	☐ ☒ ☒ ☒	1	1777339	2026-05-13 13:42:20	2026-05-13 13:44:17	--	Client-Side	Client-side line fault	OptiX OSN 1800	M...	R_LOS;ROOT/VFMOBILE/SUBNE
>	☐ ☒ ☒ ☒	2	1777333	2026-05-13 13:37:27	2026-05-13 13:39:29	--	Client-Side	Client-side line fault	OptiX OSN 9800 M24	SE...	ALM_DATA_RLOS;ALM_DATA_TI

Fault Demarcation & Locating: Line BER Fault (A)

For line BER fault, the system automatically demarcates the faults and locates the single root cause based on intelligent models, without manual intervention.



Solution generation

Cognitive Activities	Service capability	Weight	Question	√ Option A	√ Option B	√ Option C	Option D
Analysis	Solution generation	10%	How does the system support generation of emergency service restoration and fault repair solutions? Note: Remedies to optical network faults may often result in both solutions to service restoration and fault repair plans. So, the system needs to provide both types of the solutions. Fault repair solutions include: 1) the executable commands/scripts for the faults that can be remotely recovered; 2) On-site repair instructions for faults that require on-site handling.	The system automatically generates optimal emergency service restoration solutions and fault repair solutions based on intelligent models , without the need for human confirmation.	The system automatically generates possible emergency service restoration solutions and fault repair solutions based on policies, but needs human confirmation.	The system generates possible emergency service restoration solutions and fault repair solutions based on predefined rules and needs Human confirmation.	Emergency service restoration solutions and fault repair solutions need to be manually generated based on expertise.

Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
A	A	A	B	A	B



Solution generation: Board/Module Fault & Line Interruption Fault & Optical Power Fault & Line BER Fault (A)

For these 4 types of faults, the NMS automatically generates emergency service restoration solutions and fault repair solutions based on intelligent models, without the need for human confirmation.

service restoration solutions

In NMS, Different Minimum latency/Minimum Hop/High bandwidth utilization routing policies are selectable for restoration path calculating.

Protection Policy

Protection mode: None

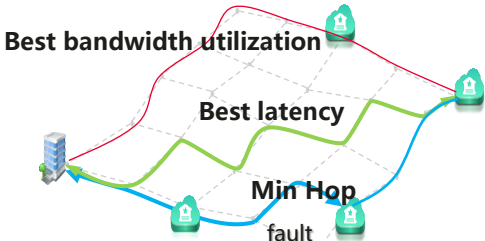
Route Calculation Policy

Pre-calculated routes: - 2 +

Routing policy: Minimum latency

Custom

Private line: ☐ SLA profile for private line services:



Multi-factor routing algorithm

fault repair solutions

Board/Module fault type for example

Details

Incident Information

Device Name/Serial Number: N-90135

Occurrence Time: 2026-05-13 13:35:45

Incident Name: Optical module fault

Incident Details: LASER_SHUT_R_LOS_ROOT/VFMOBILE/SUBNET-1_OYMAPINAR_MEDYAPARK_SANLIURFA

Diagnosis Status

Diagnosis Result: Diagnosis succeeded.

Diagnosis Time: 2026-05-13 13:40:53

Diagnosis Details: The optical module in the port is faulty. Port: N-D-Shelf0-3-G2DAP-4(OUT_1); optical module BOM code: model.

Suggestions: Remove and reinstall the optical module, or replace it.

Topo Details Performance Details

Close

For optical module fault, the replacement solution is generated by the fault tree Model.

Recovery Route1 is calculated by NMS routing algorithm.

```
2026-02-14 16:54:54,333 INFO [cspf dj.cpp:1001] [0] [364339] 0x0:==> Find a path
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:51] [0] [364339] 0x0:Convert phy path success, start to print:
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.108.179-0x0000002f, link type: 0
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.212.25.11-0x00000083, link type: 0
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x00000010, link type: 0
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.236.248.146-0x00000130, link type: 1
2026-02-14 16:54:54,334 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x00000103, link type: 0
2026-02-14 16:54:54,334 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.61.171-0x000000fe, link type: 0
2026-02-14 16:54:54,334 INFO [PhyPathHelper.cpp:56] [0] [364339] 0x0:current phy path metric:0,15625520,11943,6, 2020,19152,2,0,11943
```

And Recovery Route2 is calculated as a backup selection.

```
2026-02-14 16:54:55,074 INFO [cspf dj.cpp:1001] [0] [364339] 0x0:==> Find a path
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:51] [0] [364339] 0x0:Convert phy path success, start to print:
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.108.179-0x000000ae, link type: 0
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.142.247-0x0000005a, link type: 0
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x0000008b, link type: 0
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.236.248.146-0x0000004f, link type: 1
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x00000133, link type: 0
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.72.96-0x0000010a, link type: 0
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:56] [0] [364339] 0x0:current phy path metric:0,15627070,14119,6, 2420,4768,2,0,14119
```

Solution generation: Client Side Fault (B)

For client side fault, the system generates possible emergency service restoration solutions and fault repair solutions based on combined rules and needs Human confirmation.

Template Management

Filter

Client side fault type alarm

Combo Sorting

Export

Comment

Send Notification

Time Display Mode

Operation	Last Occurred (ST)	Arrived On (ST)	Cleared On (ST)	Alarm Serial Nu...	Incident Serial Number	Name	Severity	Alarm ID	Alarm Source	Location Info
Set Masking Rule Set Notification Rule Set Severity and Type Redefinition Rule Set Name Redefinition Rule Set Intermittent/Toggling Rule Set Aggregation Rule Correlative NE Alarm Locate in Topology Locate in NE Panel Go To Intelligent Incident	2026-05-08 00:27:04	2026-05-08 00:24:59		23140305		R_LOS	Critical	1	B1379	0-subrack-1-V8T404-2(RX2/TX2)(SiB504...

setting solutions rules for the R_LOS Client side fault type alarm.

Alarm Details

Alarm Details and Handling Procedure

Experience

Handling Records in Last 2 Months

Duration:

—

Incident Serial Number:

1111211918951

Cockpit Event Serial Number:

T-FAULT-23140305

Possible Causes:

Subnet:

RC...YA

Other Information:

Location Info:

0-subrack-1-V8T...3504_W_2)_-

Causes:

(1)The fiber jumper is not connected at the optical interface of the board;

(2)The laser of the board on the opposite station is shutdown;

(3)A fiber break occurs in the transmission line;

(4) The attenuation of the transmission line is overlarge;

(5)The transmit part of the opposite station is faulty;

(6)The receive unit at the local station is faulty;

Processing Status

Clearance Status

Cleared On (ST):

Acknowledgement Status

Acknowledged On (ST):

Comments

Click to edit comments.

And manually confirmation according to the alarm cause.

Close



Solution generation: Power & high temperature Fault (B)

MF

MAXIMO FAULT MANAGEMENT TR

To odafone

Case Details:

Case Number: 01

Report Date: 10/05/2026 23:37:00

Alert Date:

Hostname:

IP Address:

AlertKey:

Zabbix AlarmID:

Reported Priority: Low

Domain Type: TRANSMISSION

Case Type:

Case Info: K' T (INTTEMPHIGH)

Case Info Details: equipmentAlarm, [AlarmName = Card over temperature] [ObjectFullName = network:1:shelf-2:slot-4:RA5PB:tnIntTempHighRaisedNotif:alarmId:11643303]

Alcatel Alarm 2026530323917

Reported By: AUTIN

Originating Department: Transmission Level 1

Responsible Department:

Responsible Person:

Problem Type : Card over temperature -

Severity: MINOR

Changed By:

Status: DRAFT

Pending Type:

Pending Info:

Remark:

Click on the link below to go directly to the record.

<https://mas.manage.maximo.vodafone.com.tr/maximo/oslc/graphite/manage-shell/index.html?event=loadapp&value=FAULTMAN&uniqueid=405588281>

An automatic email is sent when the temperature rises and then the field team is assigned to the relevant site.



Solution evaluation & Decision making

Cognitive Activities	Service capability	Weight	Question	√ Option A	√ Option B	√ Option C	Option D
Decision	Solution evaluation & Decision making	10%	How does the system support evaluation & decision of emergency service restoration and fault repair solutions?	The system automatically evaluates and determines the optimal emergency service restoration solution for execution based on AI intelligent models (e.g., optical behavior simulation based on AI-enabled Network Digital Twins (NDT)), without the need for human confirmation. The system automatically also evaluates and determines the optimal fault repair solution to for execution based on intelligent models, without the need for human confirmation.	The system automatically evaluates several possible emergency service restoration solutions and fault repair solutions based on policies, and may need human validation.	The system evaluates several possible emergency service restoration solutions and fault repair solutions based on pre-defined rules, and needs human validation.	Manually evaluates and determines the optimal emergency service restoration solutions and fault repair solutions.

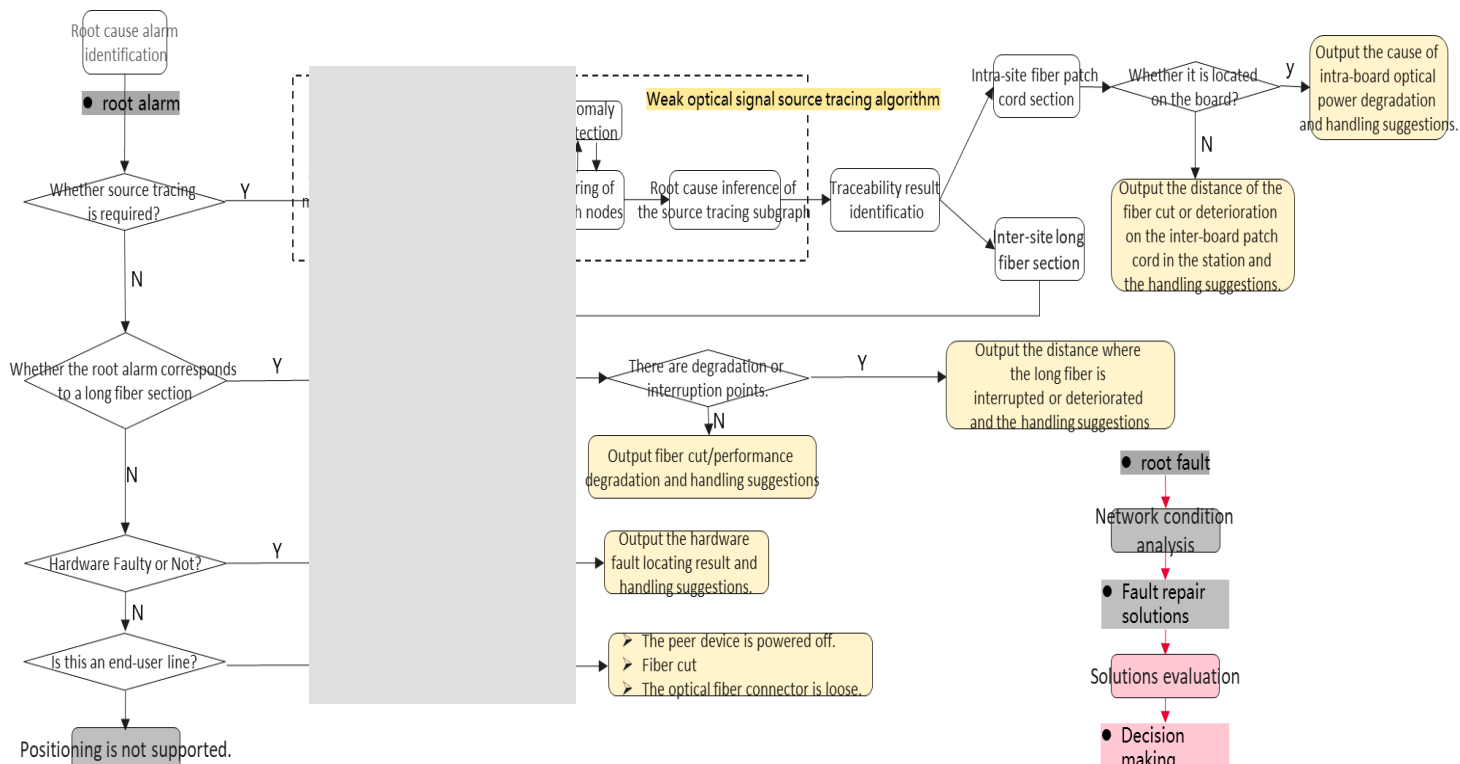
Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
B	A	B	B	A	C



Evidence: repair solution is evaluated and chose by OTN fault tree Model

OTN fault tree Model

The generated fault repair solutions are evaluated by the model and the most optimal one is chose accordingly.



solutions evaluating Inference Log Example of fault tree Model

The Model firstly updates FD detecting result to solutions evaluating inference input.

```
# ===== FD Result Update -----#
2026-06-09 11:46:10.715 INFO [https-jmx-net-127.0.1.25900-execute-1-6000d45981f583eall@locaterService.265] incident.1761343285985 begin update result
2026-06-09 11:46:10.715 INFO [https-jmx-net-127.0.1.25900-execute-1-6000d45981f583eall@locaterService.265] Additional information success, info is AdditionalInformation{pos=8.567km, netName=9-2026, arMid=null, fiberName=null}
2026-06-09 11:46:10.715 INFO [SenderHelper.118] diagnose send incident to AFIM.1761343285985, 2026-06-09 11:35:07., OPENED.SUCCESS,rcm{"name":"","long fiber fault":"","detailinformation":"","OTS optical power degradation","destination end degrades 3.8dB, source port: 9-208-Sheff0-12-5ZDAPXF-11(IN/LIN/OUT), destination port: 20-211-Sheff0-15-5ZDAPX-11(IN/LIN/OUT), ""id"":""\\domain \\\\"diagnosisInstruction\\\"\\\\\\"repairAdvice\\\"\\\\\\"station-to-station optical path degradation, repair suggestion: 1) It is recommended to adjust optical power by ODV3 tool or NMS remotely. 2) Please confirm the station optical path between the OTS source and destination end. Please go to the site to confirm the station optical path between the source and destination network elements ""description\\\"\\\\\\"rcObjStationName\\\"\\\\\\"rootCauseObj\\\"\\\\\\"id\\\""":""1002N\\\"\\\\\\"type\\\""":""LongFiber-Landmark\\\"\\\\\\"state\\\""":""\\\\"location\\\"\\\\\\"OTS TRAIL=""}}
2026-06-06 03:20:20 - 9342353-wdm\\\\"\\\\"name\\\""":null,""subObjName\\\""":null,""objId\\\""":null,""FE-1678253P-FR-OS-15-F, P-P,3-11T\\\""":null},"OTS optical power degradation, source port: 9-208-Sheff0-12-5ZDAPXF-11(IN/LIN/OUT), destination port: 20-211-Sheff0-15-5ZDAPX-11(IN/LIN/OUT), , restoration station optical path power degradation, repair suggestion: 1) It is recommended to adjust optical power by ODV3 tool or NMS remotely. 2) Please confirm the station optical path between the OTS source and destination end. Please go to the site to confirm the fault points between the source and destination network elements rc(796562829|796559018, 796562829)
```

...

The Model then queries the power weak OTS downstream OA performance, the OA optical power margin is also calculated.

[illegible]

The Model includes that power adjusting range exceeds the safety threshold and recommends to go on-site fixing.

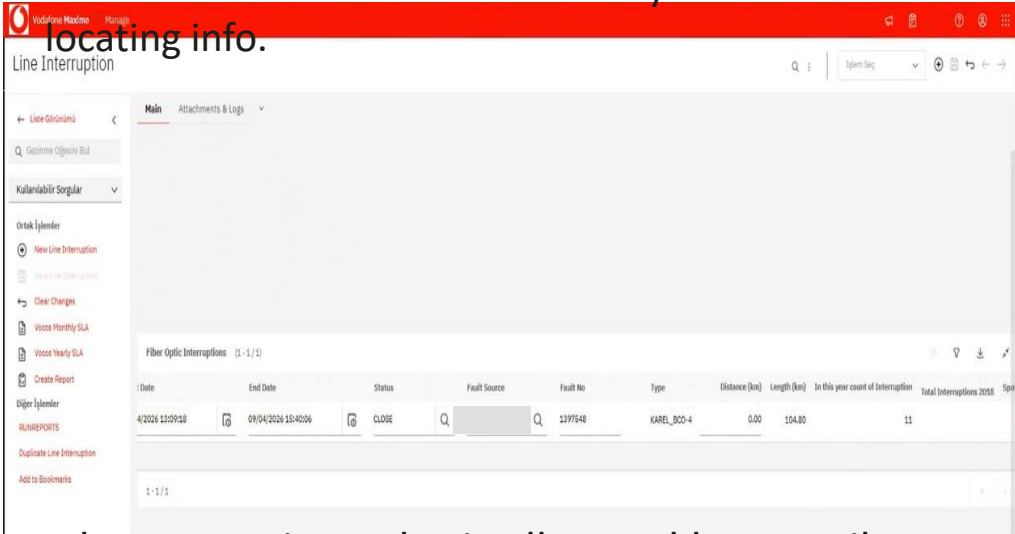
Solution evaluation & Decision making: Line Interruption Fault (A)

For line interruption fault, the system automatically evaluates several possible emergency service restoration solutions and fault repair solutions based on AI models, without human validation.

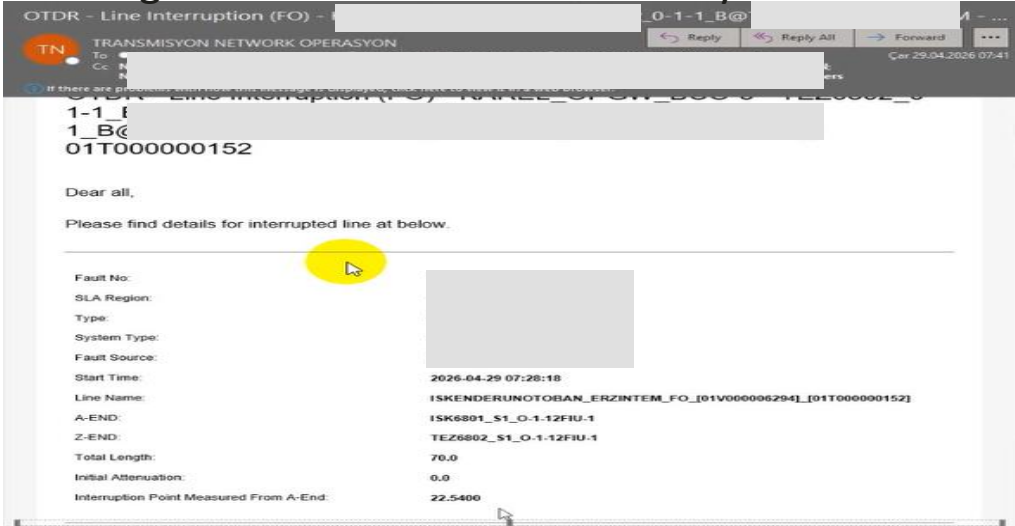
service restoration solutions

According to the fault tree Model decision, the **repair solution** is sent to the work order system with OTDR

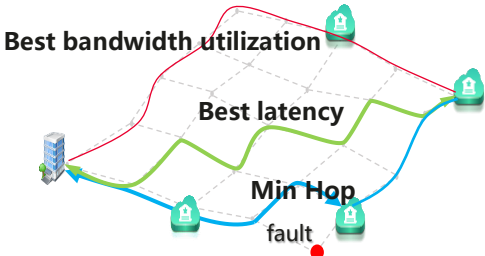
locating info.



The go on-site order is allocated by e-mail.



Multi-factor routing algorithm



Server available solutions of 1 routing policy are compared and evaluated in the algorithm by metric, and the most optimal solution is selected.

Recovery Route1 is calculated.

```
2026-02-14 16:54:54,333 INFO [cspf dj.cpp:1001] [0] [364339] 0x0:==> Find a path
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:51] [0] [364339] 0x0:Convert phy path success, start to print:
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.108.179-0x00000002f, link type: 0
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.212.25.11-0x000000083, link type: 0
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x000000010, link type: 0
2026-02-14 16:54:54,333 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.236.248.146-0x000000130, link type: 1
2026-02-14 16:54:54,334 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x000000103, link type: 0
2026-02-14 16:54:54,334 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.61.171-0x0000000fe, link type: 0
2026-02-14 16:54:54,334 INFO [PhyPathHelper.cpp:56] [0] [364339] 0x0:current phy path metric:0,15625520,11943,6, 2020,19152,2,0,11943
```

Recovery Route2 is calculated.

```
2026-02-14 16:54:55,074 ERROR [cspf dj.cpp:1001] [0] [364339] 0x0:==> Find a path
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:51] [0] [364339] 0x0:Convert phy path success, start to print:
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.108.179-0x0000000ae, link type: 0
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.142.247-0x00000005a, link type: 0
2026-02-14 16:54:55,074 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x00000008b, link type: 0
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.236.248.146-0x00000004f, link type: 1
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.148.52-0x000000133, link type: 0
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:66] [0] [364339] 0x0:PrintPhyPath, phy link: 8.241.72.96-0x00000010a, link type: 0
2026-02-14 16:54:55,075 INFO [PhyPathHelper.cpp:56] [0] [364339] 0x0:current phy path metric:0,15627070,14119,6, 2420,4768,2,0,14119
```

And Route2 is finally select for larger metric.

```
2026-02-14 16:54:55,196 INFO [cspf otn batch calc.cpp:929] [0] [364339] 0x0:got a valid ksp path pair, cur size: 2
2026-02-14 16:54:55,196 INFO [cspf otn batch calc.cpp:956] [0] [364339] 0x0:ksp path2 metric is larger than ksp1, path2 is selected.
2026-02-14 16:54:55,197 INFO [cspf otn constraint.cpp:395] [0] [364339] 0x0:add otn link to include map: 8.241.108.179-0x0000000ae;
2026-02-14 16:54:55,197 INFO [cspf otn constraint.cpp:395] [0] [364339] 0x0:add otn link to include map: 8.241.142.247-0x00000005a;
```

Solution evaluation & Decision making: Board/Module Fault & Optical Power Fault(B)

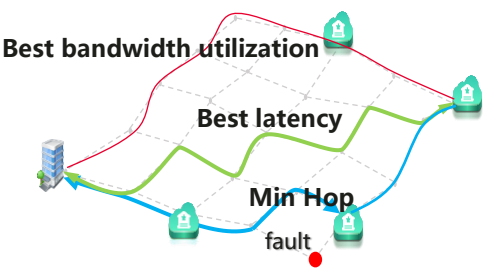
For board/module fault, the system automatically evaluates several possible emergency service restoration solutions and fault repair solutions based on policies, and may need human validation.

service restoration solution

fault repair solution

As Line Interruption Fault, the service restoration solutions are calculated and finally determined by the algorithm.

Multi-factor routing algorithm



Server available solutions of 1 routing policy are compared and evaluated in the algorithm by metric, and the most optimal solution is selected.

Details

Board/Module fault type

Incident Information

Device Name/Serial Number135

Incident NameOptical module fault

Occurrence Time2026-05-13 13:35:45

Incident DetailsLASER_SHUT_R_LOS_ROOT/VFMOBILE/SUBNET-1_OYMAPINAR_MEDYAPARK_SANLIURFA

Diagnosis Status

✓

Diagnosis Result

Diagnosis Time

Diagnosis Details

Suggestions

Diagnosis succeeded.

2026-05-13 13:40:53

The optical module in the port is faulty: Port: heli0-3-G2DAP-4(OUT_1); optical module BOM code: 14_model: 1

Remove and reinstall the optical module, or replace it.

Topo

Details

Performance Details

1

SEMIC

Close

Normally need human making replace decision according to the suggestion.

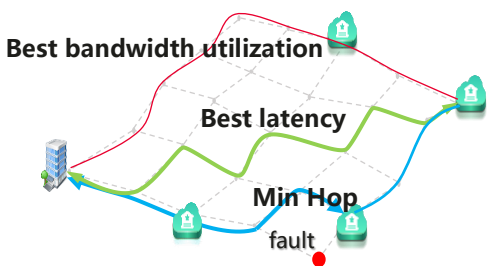


Solution evaluation & Decision making: Line BER Fault (A)

For line BER fault, the system automatically evaluates and determines the optimal emergency service restoration solution for execution without the need for human confirmation, and also automatically evaluates and determines the optimal fault repair solution.

As Line Interruption Fault, the service restoration solutions are calculated and finally determined by the algorithm.

Multi-factor routing algorithm



Server available solutions of 1 routing policy are compared and evaluated in the algorithm by metric, and the most optimal solution is selected.

ODU Performance Deterioration

Line BER fault type

Search for locations: Separ

☐ Location	☐ Number of Issue Objects	☐ Number of Affected Services	☐ Occur Time	Suggestion
☐ [redacted]	1	1	2026-06-06 17:45:00	You are advised to click the number of problem objects to view the problem object list and handle the problem according to the handling suggestions.
☐ [redacted]	1	1	2026-06-06 17:45:00	You are advised to click the number of problem objects to view the problem object list and handle the problem according to the handling suggestions.
☐ [redacted]	1	1	2026-06-06 17:45:00	You are advised to click the number of problem objects to view the problem object list and handle the problem according to the handling suggestions.
☐ [redacted]	1	1	2026-06-06 17:45:00	You are advised to click the number of problem objects to view the problem object list and handle the problem according to the handling suggestions.
☐ [redacted]	1	1	2026-06-06 17:45:00	You are advised to click the number of problem objects to view the problem object list and handle the problem according to the handling suggestions.
☐ [redacted]	1	1	2026-06-06 17:45:00	You are advised to click the number of problem objects to view the problem object list and handle the problem according to the handling suggestions.

Total records: 9

10 pcs/page1

List of Issue Objects

Issue Object	☐ Number of Affected Services	☐ Occur Time	Diagnosis Info	Suggestion	Operation
Errored Second Performance	1	2026-06-06 17:45:00	--	You are advised to locate the deterioration cause based on the alarms and performance status of the ODU route.	

The optimal **repair solution** is advised.

Solution evaluation & Decision making: Power & high temperature Fault (C)

MF

MAXIMO FAULT MANAGEMENT TR

To

Case Details:

Case Number:

Report Date: 10/05/2026 23:37:00

Alert Date:

Hostname:

IP Address:

AlertKey:

Zabbix AlarmID:

Reported Priority: Low

Domain Type: TRANSMISSION

Case Type:

Case Info: KY 2-4,EQPT (INTTEMPHIGH)

Case Info Details: equipmentAlarm, [AlarmName = Card over temperature] [ObjectFullName = :shelf-2:slot-4:RA5PB:tnIntTempHighRaisedNotif:alarmId:11643303]

Alcatel Alarm 2026530323917

Reported By: AUTIN

Originating Department: Transmission Level 1

Responsible Department:

Responsible Person:

Problem Type : Card over temperature -

Severity: MINOR

Changed By:

Status: DRAFT

Pending Type:

Pending Info:

Remark:

Click on the link below to go directly to the record.

<https://mas.manage.maximo.vodafone.com.tr/maximo/osl/graphite/manage-shell/index.html?event=loadapp&value=FAULTMAN&uniqueid=405588281>

An automatic email is sent when the temperature rises and then the field team is assigned to the relevant site.

The field team's control steps are as follows:

1. Check the room temperature.
2. Check the air conditioning status.
3. Check the air conditioning settings.
4. Check and clean the equipment ventilation filters.
5. Check the equipment fans.
6. Check the shelf/cabinet power supply.
7. If a single board temperature is excessive, check the board.
8. Check the shelf temperature.

Then the field team repair the fault by checklist on site.



Solution implementation and verification

Cognitive Activities	Service capability	Weight	Question	√ Option A	Option B	√ Option C	Option D
Execution	Solution implementation and verification	15%	How does the system support automatic execution and verification of emergency service restoration and fault repair solution, and provide assistance to field engineers? 1) troubleshooting solutions repair commands/ scripts for the faults that can be remotely recovered; 2) On-site repair instruction for the faults that on-site handling is necessary (such as power supply failure, board fault, fiber cut) to enable the human: - to query the recommended checklists to repair the fault. - to check the fault resolution effect and report it to NOC.	The system supports automatic execution and verification of emergency service restoration, while meeting carrier-grade high reliability requirements (e.g., SNCP recovery or OCH link restoration within 50ms (ref. ITU-T G873.1)). The system also automatically executes the commands/scripts for remotely recoverable faults and provides intelligent on-site handling instructions for faults that require on-site repair, without NOC assistance.	The system supports automatic execution of emergency service restoration. Verification is performed by experts based on alarms and KPIs. The system supports automatic execution of fault repair solutions, and may need human verification. On-site handling is assisted by network tools but still requires NOC support.	Emergency service restoration is executed manually, and verified by experts based on alarms and KPIs. Fault repair solutions are executed and verified manually. On-site handling is guided by the NOC.	

Equipment	Communication				Environmental
Board/Module Fault	Line Interruption	Optical Power Fault	Client Side Fault	Line BER	power & high temperature
B	B	A	C	C	C



Solution implementation and verification: Board/Module Fault (B)

For board/module fault, the system supports automatic execution and verification of emergency service restoration, while meeting carrier-grade high reliability requirements. The system also provides on-site handling instructions.

The fault recovery solution is sent to NE, the rerouting is executed by ASON.

```
2026-06-04 19:38:56
LSP (0x...R);Cause:reroute;Detail:PORT_FAIL;Err_N=0xac100a02;Err_L=0x0000001b; R=0,B=2,P=1;CH= (0:0);
N:0xac100a01,L:0x000001b0;R=0,B=22,P=3;CH= (0:1)
N:0xac100a01,L:0x000001cc;R=0,B=32,P=1;CH= (0:20488)
N:0xac100a03,L:0x00000017;R=0,B=1,P=1
N:0xac100a03,L:0x00000019;R=0,B=2,P=1;CH= (0:20483)
N:0xac100a02,L:0x00000021;R=0,B=11,P=1
N:0xac100a02,L:0x0000001c;R=0,B=3,P=3;CH= (0:1)
```

NE ASON execution log

iMaster NCE											
Physical Topology NE Upgrade ... X Inventory Re... X Wavelength ... X WDM/OTN A... X WDM/OTN A... X Rerouting H... X											
Name	Source	Sink	QoS	Index	LSP Primary Tag	LSP Change Reason	The Route After Triggered	Relay	Fault Node	Node with LSP Setup	Error Code for LSP Se...
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	MT		5...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	PS		4...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	PS		4...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	MT		5...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	PS		4...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	PS		4...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	UR		04-1	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	PS		4...	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Rerouted to the preset path:channel fault	Positive route HSR9804_S2_EA'S-S...	TC		14...	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	UR		04-2	
DLT102_21.0DU2.DLTE.17			QoS.1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	ITS		15...	
DLT102_21.0DU2.DLTE.17			QoS.1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITS		15...	

NE ASON rerouting event

Details

Board/Module fault type

Incident Information

Device Name/Serial Number NC...35

Incident Name Optical module fault

Occurrence Time 2026-05-13 13:35:45

Incident Details LASER_SHUT_R_LOS_ROOT/VFMOBILE/SUBNET-1_OYMAPINAR_MEDYAPARK_SANLIURFA

Diagnosis Status

✓

Diagnosis Result

Diagnosis Time

Diagnosis Details

Suggestions

✓

Diagnosis succeeded.

2026-05-13 13:40:53

The optical module in the port is faulty. Port N...-Shelf0-3-G2DAP-4(OUT 1): optical module BOM code: ...model TN...1S.

Remove and reinstall the optical module, or replace it.

Topo

Details

Performance Details

For optical module fault, the on-site handling(to replace which BOM code and card type) instruction is provided.

After replacement, the OTN quality assurance Model will verify that the fault is fixed and related service impact not any more exists.



Solution implementation and verification: Line Interruption Fault (B)

For line interruption fault, the system supports automatic execution and verification of emergency service restoration, while meeting carrier-grade high reliability requirements. The system also provides on-site handling instructions.

The fault recovery solution is sent to NE, the rerouting is executed by ASON.

2026-05-27 16:03:52
LSP (0x...IR); Cause: reroute; Detail: PORT_FAIL; Err N=0xac100a08; Err L=0x00000001f; R=0, B=2, P=4; CH= (0:0);
N: 0xac100a01, L: 0x0000001b0; R=0, B=22, P=3; CH= (0:1)
N: 0xac100a01, L: 0x0000001cc; R=0, B=32, P=1; CH= (0:2048)
N: 0xac100a05, L: 0x00000017; R=0, B=1, P=1
N: 0xac100a05, L: 0x00000019; R=0, B=2, P=1; CH= (0:20483)
N: 0xac100a08, L: 0x00000021; R=0, B=7, P=3
N: 0xac100a08, L: 0x0000001c; R=0, B=3, P=3; CH= (0:1)

NE ASON execution log

iMaster NCE									
Physical Topology NE Upgrade ... X Inventory Re... X Wavelength ... X WDM/OTN A... X WDM/OTN A... X Rerouting H... X									
Name	Source	Sink	QoS	Index	LSP Primary Tag	LSP Change Reason	The Route After Triggered	Relay	Fault Node
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	MT	5...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	PS	14...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	MT	5...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	PS	14...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITR	15...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	PS	14...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITR	15...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	TY	15...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:channel fault	Positive route HSR9804_S2_EA'S-S...	TC	14...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	UR	04-1
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	PS	14...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...	ITR	15...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	TY	15...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:channel fault	Positive route HSR9804_S2_EA'S-S...	TC	14...
DILT102_21.0DU2.DILTE_17			QoS_1	first		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	first		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	UR	04-2
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITR	15...
DILT102_21.0DU2.DILTE_17			QoS_1	second		Successful LSP Reroute Back	Positive route HSR9804_S2_EA'S-S...		
DILT102_21.0DU2.DILTE_17			QoS_1	second		Rerouted to the preset path:port fault	Positive route HSR9804_S2_EA'S-S...	ITR	15...

NCE ASON rerouting event

Details

Incident Information

Device Name/Serial Number: F 35 Occurrence Time: 2026-05-13 15:07:03

Incident Name: Single-wavelength optical path interruption Incident Details: R_LOS;ROOT/VMOBILE/SUBNET-10_AVRUPA

Diagnosis Status

Diagnosis Result: Diagnosis succeeded.

Diagnosis Time: 2026-05-13 15:11:11

Diagnosis Details: 1. The inter-site optical path is interrupted, and the sink port cannot receive optical signals. Source port: I..._E-Shelf0-5-F2ELOM-1(IN1/OUT1 (7dB)); sink port: M..._O-Shelf1-11-130BU1-1(IN_DCM(s)/L-2.3dB_VI/VQ-17_FQ_01V000015614) 2. The transmit power of port Shelf0-22-55N02-2(IN2/OUT2) on NE MGH8801_S10_E is abnormal.

Suggestions: 1. The inter-site optical path is interrupted. Check the long fibers (including connectors), pigtails, boards, and modules involved...



Line interruption fault type

For this fault, the on-site handling(detail interruption location is indicated by OTDR measuring) instruction is provided.

After on-site handling, the OTN quality assurance Model will verify that the fault is fixed and related service impact not any more exists.



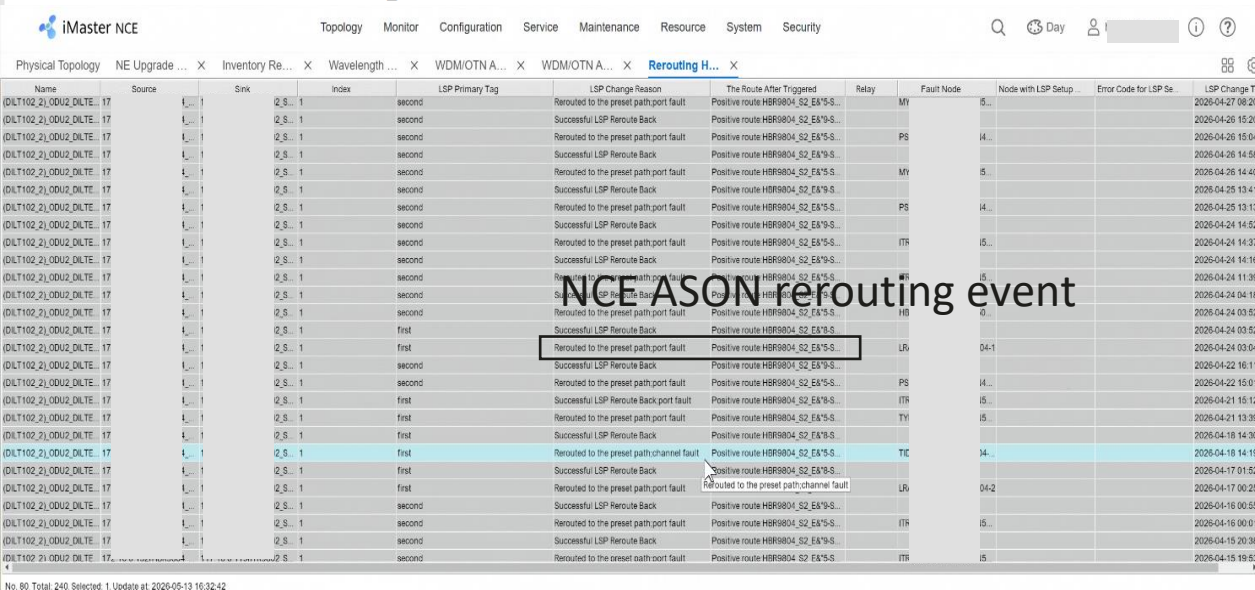
Solution implementation and verification: Optical Power Fault (A)

For optical power fault, the system supports automatic execution and verification of emergency service restoration, while meeting carrier-grade high reliability requirements. The system also provides on-site handling instructions.

The fault recovery solution is sent to NE, the rerouting is executed by ASON.

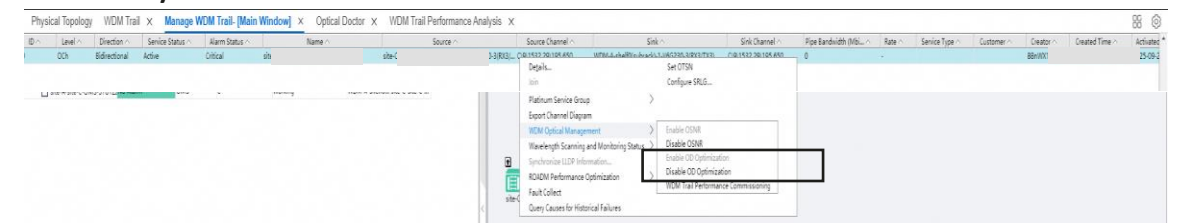
2026-05-20 06:26:16
LSP((, FIR));Cause:reroute;Detail: LAMBDA_ALM;Err_No=0x0ab41604;Err_L=0x00000000; ;CH=0x0000;Cost_T=101;
N:0x0ab41605,L:0x00000004;R=0,B=1,P=1;IS_OMSP=no;CH=0x00060
N:0x0ab41605,L:0x00000004;R=0,B=1,P=1;IS_OMSP=no;CH=0x0060
N:0x0a0b0c05,L:0x00000008;R=2,B=11,P=49;IS_OMSP=no
N:0x0a0b0c05,L:0x00000007;R=0,B=1,P=15;IS_OMSP=no;CH=0x0060
N:0x0a0b0c04,L:0x00000006;R=0,B=1,P=15;IS_OMSP=no
N:0x0a0b0c04,L:0x00000008;R=2,B=11,P=49;IS_OMSP=no;CH=0x0060
N:0x0ab41604,L:0x00000004;R=0,B=1,P=1;IS_OMSP=no;CH=0x0000
N:0x0ab41604,L:0x00000004;R=0,B=1,P=1;IS_OMSP=no;CH=0x0060

NE ASON execution log



NCEASONrerouting event

For this fault, the automatically optical power optimization can be triggered after the optimization repair solution is evaluated and chose by OTN fault tree Model.



The EMCA optimization process log recorded as:

```
[20:48:34.094]Warn,[T240605],[baseutils.cpp:597](default),{"objList":[{"name":"N
08:26:38 - 13514 - wdm","serviceName":"OCH","resId":"37eaf85-cd00-46f1-83d3-de3d7a6ab83d"},"isTruncated":false}
[20:48:34.094]Warn,[T240605],[baseutils.cpp:597](default),{"errorInformation":{"error
information":{"progress":"52","result":"running","startTime":"2025-04-18T12:48:27.000Z","trailStatus":{"status":"1","trail-resId":"37eaf85-cd00-46f1-83d3-
de3d7a6ab83d","trailKey":{"direction":"0","snkPortKey":{"neld":"3145780","portDirection":"0","portId":"1","shelfId":"0","slotId":"27"},"srcPortKey":{"neld":"3145741","portDirection":"1","portId":"1","s
shelfId":"0","slotId":"35"},"trailId":"2015-08-15 08:26:38 - 13514 - wdm"}}}}}}
[20:48:35.551]Info,[T259166],[net commu client.cpp:682]Http Receive serial id=668,Code=20:[{ne_id,serial,command,result,data}]3145785,2843,34758,0,]
[20:48:35.551]Warn,[T259168],[request controller.cpp:262](default),esm mission finish,mission id=600000056
[20:48:35.552]Warn,[T259168],[carrier_helper.cpp:401](default),(EMCA_LOG)seclid:0xf6001b00001b01-1744980513-DropOptimizedStep(PortAttributeUpdate),cfg-set-atten:
0x300039 - 0x1d - 1(FIBER IN, 0x101, 3)-32, Attribute = PCT SET ATN, ret = 0, Data = 4.5
...
[20:48:37.633]Warn,[T259166],[carrier_helper.cpp:401](default),(EMCA_LOG)seclid:0xf6001b00001b01-1744980513-DropOptimizedStep(PortAttributeUpdate),cfg-set-atten:
0x300039 - 0x1d - 1(FIBER IN, 0x101, 3)-32, Attribute = PCT SET ATN, ret = 0, Data = 3.5
...
[20:48:38.690]Warn,[T259168],[carrier_helper.cpp:401](default),(EMCA_LOG)seclid:0xf6001b00001b01-1744980513-DropOptimizedStep(PortAttributeUpdate),cfg-set-atten:
0x300039 - 0x1d - 1(FIBER IN, 0x101, 3)-32, Attribute = PCT SET ATN, ret = 0, Data = 3
...
[20:48:51.238]Info,[T242300],[AdjustMission.cpp:723](default),AdjustMission:SetMissionState : MissionState::DONE, for mission :6d1ea1c8-05d7-46c3-88b0-be23e8398edb
[20:48:51.239]Info,[T242300],[OmsRequestHolder.cpp:195](EMCA_LOG),SetAdjustState:SectionAdjustWaveState::DONE,omsCtrlKey:D964325218946384359, wave:WaveNo : 32,
TrailId [ 3282015-08-15 08:26:38 - 13514 - wdm - RT POSITIVE PROTECT(1)(2) - 1 - 1 - 1 - 0 ], m_rlosExist : 0, m_noPwrErrorState : 0, trailFormation: 1 m counterfeitSecne:
NOT COUNTERFEIT, Src(0x30000d - 0x21 - 2(FIBER OUT, 0x101, 3)), Snk(0x300034 - 0x17 - 2(FIBER IN, 0x103, 3)). lastTime: 1744980508
[20:48:51.239]Info,[T242300],[OmsRequestHolder.cpp:195](EMCA_LOG),Set Adjust State:SectionAdjustWaveState::DONE,omsCtrlKey:D964325218946384359, wave:WaveNo : 32,
TrailId [ 3282015-08-15 08:26:38 - 13514 - wdm - RT POSITIVE WORK(0) - 0 - 1 - 1 - 0 ], m_rlosExist : 0, m_noPwrErrorState : 0, trailFormation: 1 m counterfeitSecne:
NOT COUNTERFEIT, Src(0x30000d - 0x23 - 1(FIBER OUT, 0x101, 3)), Snk(0x300034 - 0x1b - 1(FIBER IN, 0x101, 3)). lastTime: 1744980508
[20:48:51.239]Info,[T242300],[OmsRequestHolder.cpp:430](EMCA_LOG),SetAdjustStateFinish State:SectionAdjustWaveState::DONE
```

After optical power optimization, the **OTN quality assurance Model will verify** that the fault is fixed and related service impact not any more exists.



Evidence: Client Side / Line BER / power & high temperature fault (C)

For client side fault, there is no alternative route to restore service, fault repair solutions are executed and verified manually.

For line BER fault, ASON trail rerouting implements automatically, but it needs human to start optical power optimization and verify result.

For power & high temperature fault, normally the environmental factor is adjusted by human.



Thank you.

