

Service Assurance

Customer Experience Assurance



Scoring

Process Flow	Cognitive Activity	Service Capability	Weight	Question	Method: Average							
					Criteria				Answer	Calculation		
					Option A	Option B	Option C	Option D		Original score	Compensated score	Overall Score
Service Assurance	Intent	Intent Translation & Fulfilment	10%	How does the System translate mobile Service intents (e.g., throughput, latency, availability) into network actions and evaluate their fulfillment?	4	3	0	0	A	4	4	4.00
	Awareness	Service Performance Monitoring & degradation Detection	10%	How does the System monitor mobile Service KPIs (e.g.: throughput, latency...) and detect performance degradation or anomalies?	3	2	1	0	A	3	4	
		Service Performance degradation Prediction	15%	How does the System predict Service performance degradation (e.g. Throughput, latency ...) and SLA violation before they affect Service performance?	4	3	2	0	A	4	4	
	Analysis	Service Performance degradation Impact Analysis	10%	How does the System identify and analyze the impact of performance degradation (e.g., throughput, latency ...) on user experience or SLA compliance in the mobile network?	4	3	2	0	A	4	4	
		Service Performance degradation Demarcation & Root Cause Analysis	10%	How does the System isolate the root cause of Service degradation across the network domains (i.e.: RAN, transport, and core)?	4	3	2	0	A	4	4	
		Solution Generation	15%	How does the System generate solutions to address Service degradation in mobile Services based on root cause analysis	4	3	2	0	A	4	4	
	Decision	Solution Evaluation & Decision making	20%	How does the System evaluate solution and decide on the best solution to implement ?	4	3	2	0	A	4	4	
	Execution	Solution Implementation	10%	How does the System implement solution and apply fallback mechanisms in case of solution failure?	2	1	0	0	A	2	4	

Telkomsel Service Assurance Framework

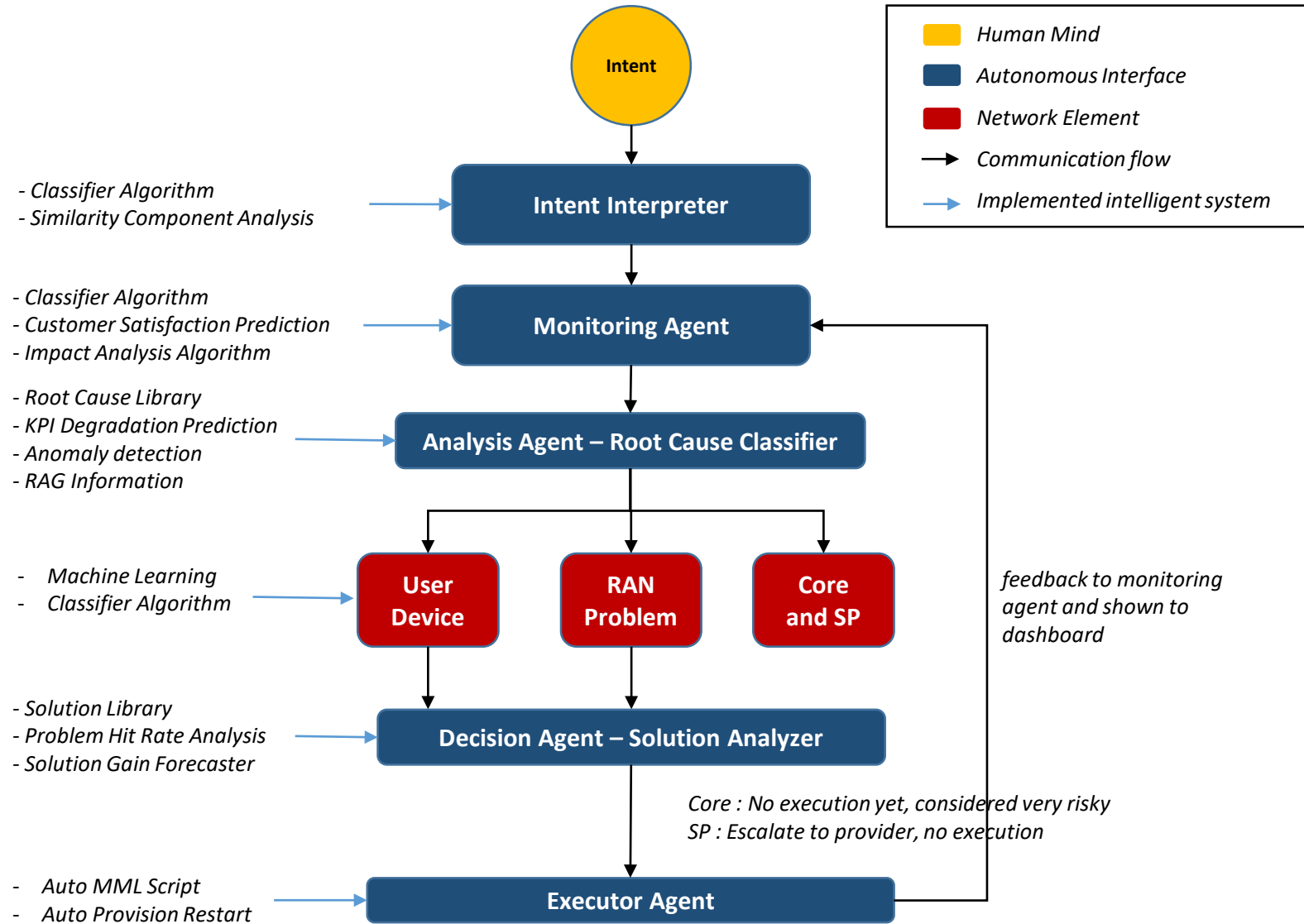


Image 1. Telkomsel agent to agent close loop - service assurance framework

Assessment Methodology

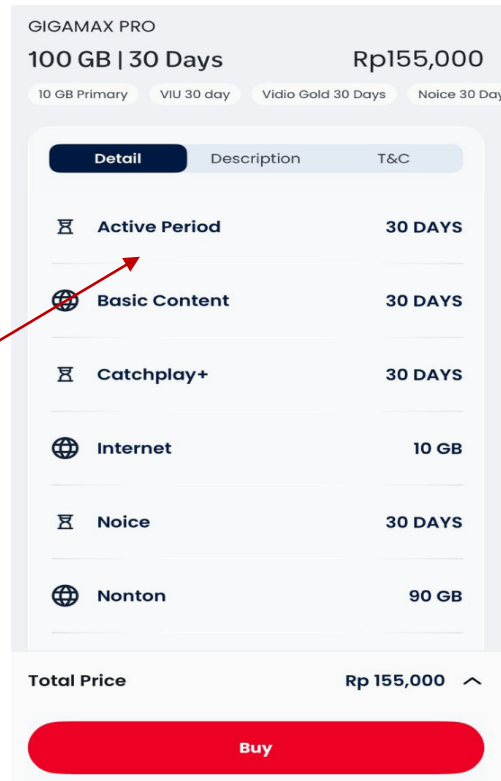
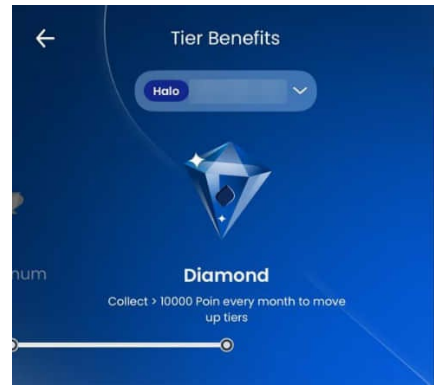
Our Answer

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Intent	Intent Translation & Fulfilment	10%	How does the System translate mobile Service intents (e.g., throughput, latency, availability) into network actions and evaluate their fulfillment?	The System automatically generates Service Assurance objectives (e.g., throughput targets, latency bounds) and policy actions based on mobile Service intents. The System evaluates intent fulfillment based on implementation effect.	The System processes Intent using predefined rules and policies. Intent fulfillment evaluation is manually validated.	Intent configuration and evaluation are entirely manual and rely on static KPIs and human expertise.	
Awareness	Service Performance Monitoring & degradation Detection	10%	How does the System monitor mobile Service KPIs (e.g.: throughput, latency...) and detect performance degradation or anomalies?	The System continuously monitors mobile Service KPIs and detects anomalies or performance degradation, without human intervention.	The System monitors Service KPIs and detects anomalies or performance degradation based on predefined rules	Performance monitoring, Service degradation and anomaly detection are determined based on human expertise	
	Service Performance degradation Prediction	15%	How does the System predict Service performance degradation (e.g. Throughput, latency ...) and SLA violation before they affect Service performance?	The System uses AI Models to analyze mobile Service performance and predicts SLA violations before they impact the user.	The System uses dynamically programable policies to analyze performance patterns and predicts potential SLA violations	The System predicts SLA violations based on pre-defined rules.	SLA violation is manually detected and addressed based on performance reports.
Analysis	Service Performance degradation Impact Analysis	10%	How does the System identify and analyze the impact of performance degradation (e.g., throughput, latency ...) on user experience or SLA compliance in the mobile network?	The System identifies and analyzes the impact of performance degradation, using AI models without human intervention.	The System identifies and analyzes the impact of mobile Service degradation using dynamically programable policies, but requires human confirmation to proceed.	The System identifies & analyzes impact of performance degradation, based on predefined rules	Impact of degradation is determined based on human expertise.
	Service Performance degradation Demarcation & Root Cause Analysis	10%	How does the System isolate the root cause of Service degradation across the network domains (i.e.: RAN, transport, and core)?	The System isolates and analyzes the root cause of mobile Service degradation across network domains using AI models, without human intervention.	The System isolates and analyzes the root cause of mobile Service degradation using dynamically programable policies, but requires human confirmation.	The System isolates & analyzes performance degradation Root Cause, based on predefined rules	Performance data and alarms are manually analyzed to determine the root cause.
	Solution Generation	15%	How does the System generate solutions to address Service degradation in mobile Services based on root cause analysis	The System generates corrective actions to address mobile Service degradation and continuously learns from past resolutions using AI models, without human intervention.	The System generates corrective actions using dynamically programable policies based on prior resolutions but requires human confirmation before execution.	The System suggests corrective actions based on predefined rules.	Solutions are manually created based on human expertise
Decision	Solution Evaluation & Decision making	20%	How does the System evaluate solution and decide on the best solution to implement	The System evaluates multiple remediation options, analyzes risk and trade-offs, and selects the best solution using AI models, without requiring human decision-making.	The System assesses remediation options using dynamically programable policies and recommends the optimal choice, but requires human approval.	Remediation options, risk assessment and selection of appropriate solutions are manually done	
Execution	Solution Implementation	10%	How does the System implement solution and apply fallback mechanisms in case of solution failure?	The System implements the selected corrective action and triggers fallback mechanisms in case of failure, without human intervention	The System applies corrective action and fallback mechanisms using pre-defined rules, based on human approval.	Implementation and fallback handling are manually executed	

Intent Translation & Fulfilment

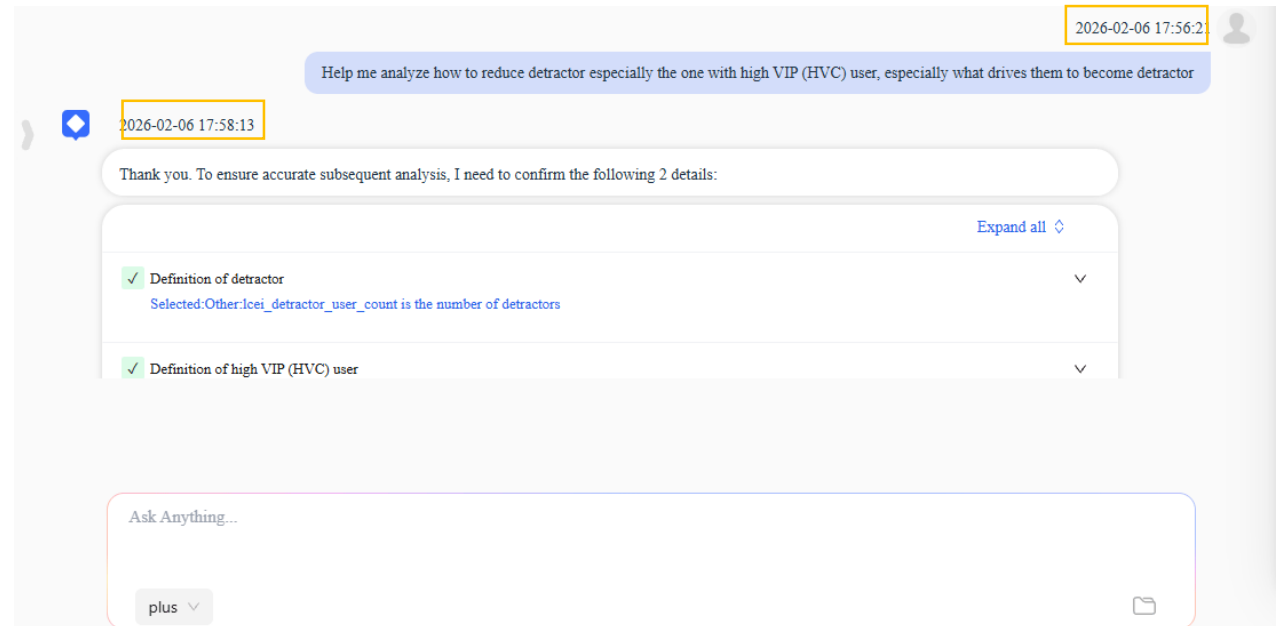
Q: How does the System translate mobile Service intents (e.g., throughput, latency, availability) into network actions and evaluate their fulfilment?

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Intent	Intent Translation & Fulfilment	10%	How does the System translate mobile Service intents (e.g., throughput, latency, availability) into network actions and evaluate their fulfilment?	The System automatically generates Service Assurance objectives (e.g., throughput targets, latency bounds) and policy actions based on mobile Service intents. The System evaluates intent fulfillment based on implementation effect.	The System processes Intent using predefined rules and policies. Intent fulfillment evaluation is manually validated.	Intent configuration and evaluation are entirely manual and rely on static KPIs and human expertise.	



The system achieves a closed-loop "Business-to-Network" intent translation for individual VIP subscribers, transforming high-level business experience targets into executable network assurance policies without manual intervention.

As clarified in Phase 1, the system focuses on the **Telkomsel VVIP assurance scenario**, aiming to deliver an ultimate network experience. The process begins with the AI Copilot, where an operator can query: "How to reduce VVIP detractors and analyze the causes?"



Intent Translation & Fulfilment

Executive Summary

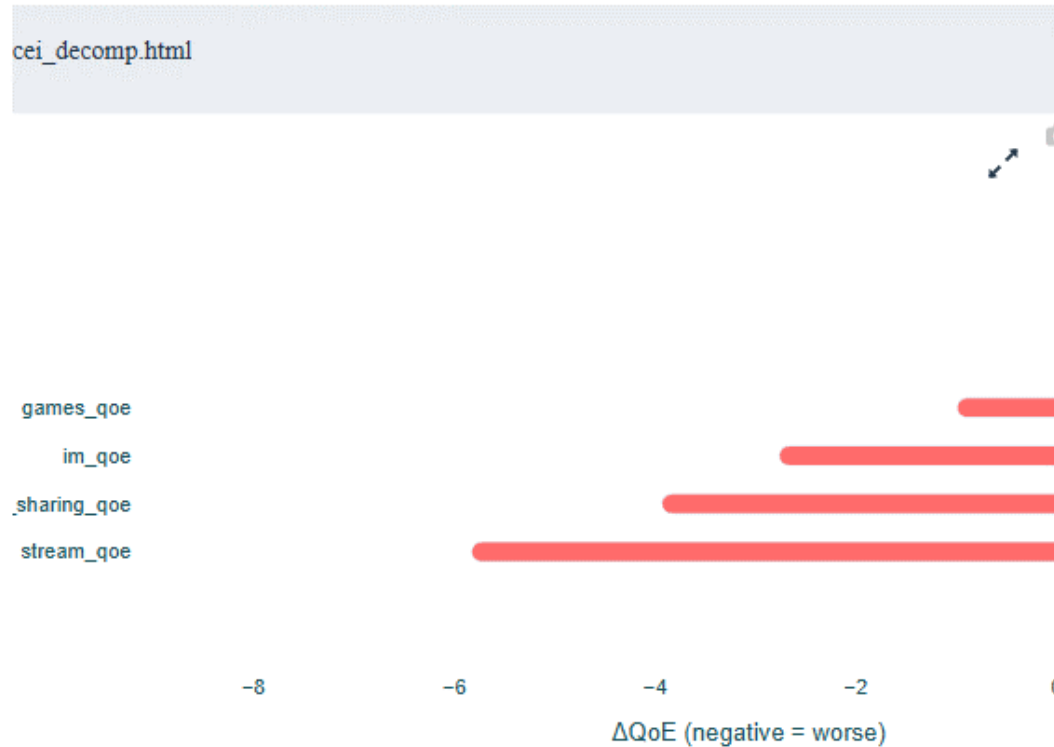
High-Value-Customer (HVC) detractor ratio in the worst-performing 10 % of cells is 48 % versus 32 % in the remaining network ($p < 0.001$, Cohen $d = 0.54$). The primary QoE degradation stems from **Streaming** (-5.8 Δ QoE) and **File-Sharing** (-3.9 Δ QoE) services. The biggest accumulated network-level anomalies are **Streaming Z-score**, **Games Z-score**, and **VoIP Z-score**. Setiabudi district concentrates the highest pain.

Key Findings

Statistical Significance

Two-sample t-test confirms the analysis group is materially worse; chance probability < 0.001 .

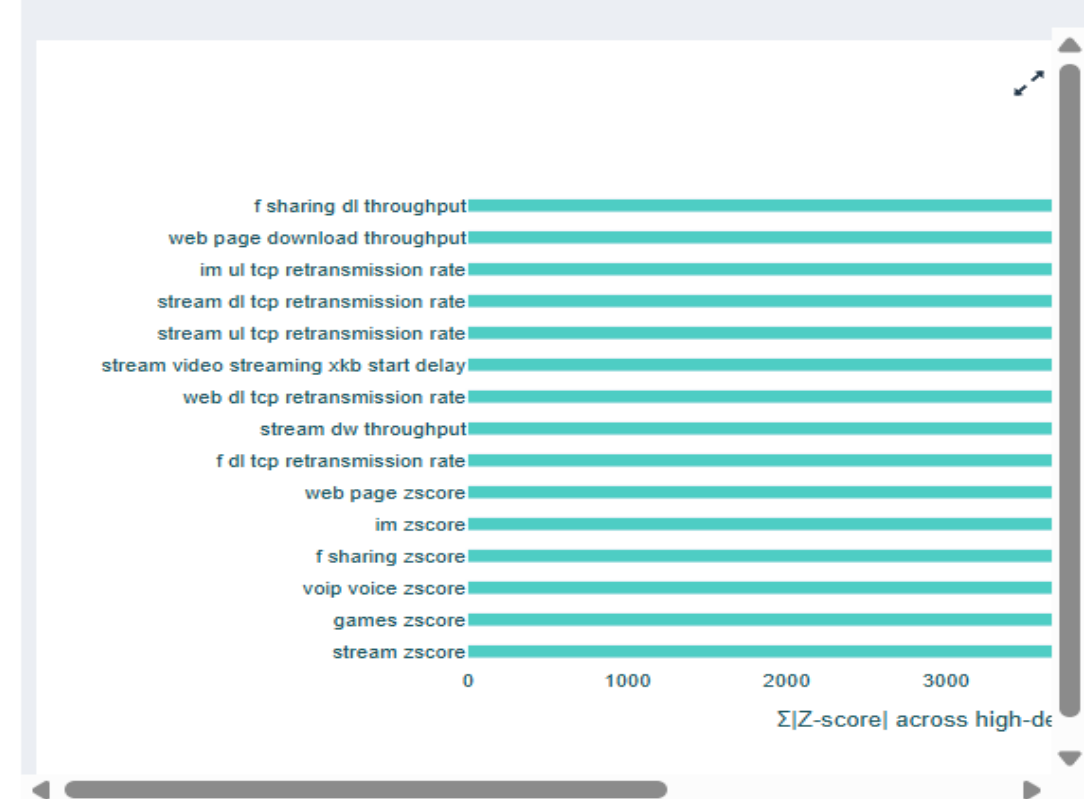
Service-Level Contribution to CEI Drop



the System backend automatically translates these business intents into relevant network performance objectives (e.g., specific throughput and latency targets) and evaluates fulfillment based on the implementation effect.

Trigger KPI Impact

trigger_impact_bar.html



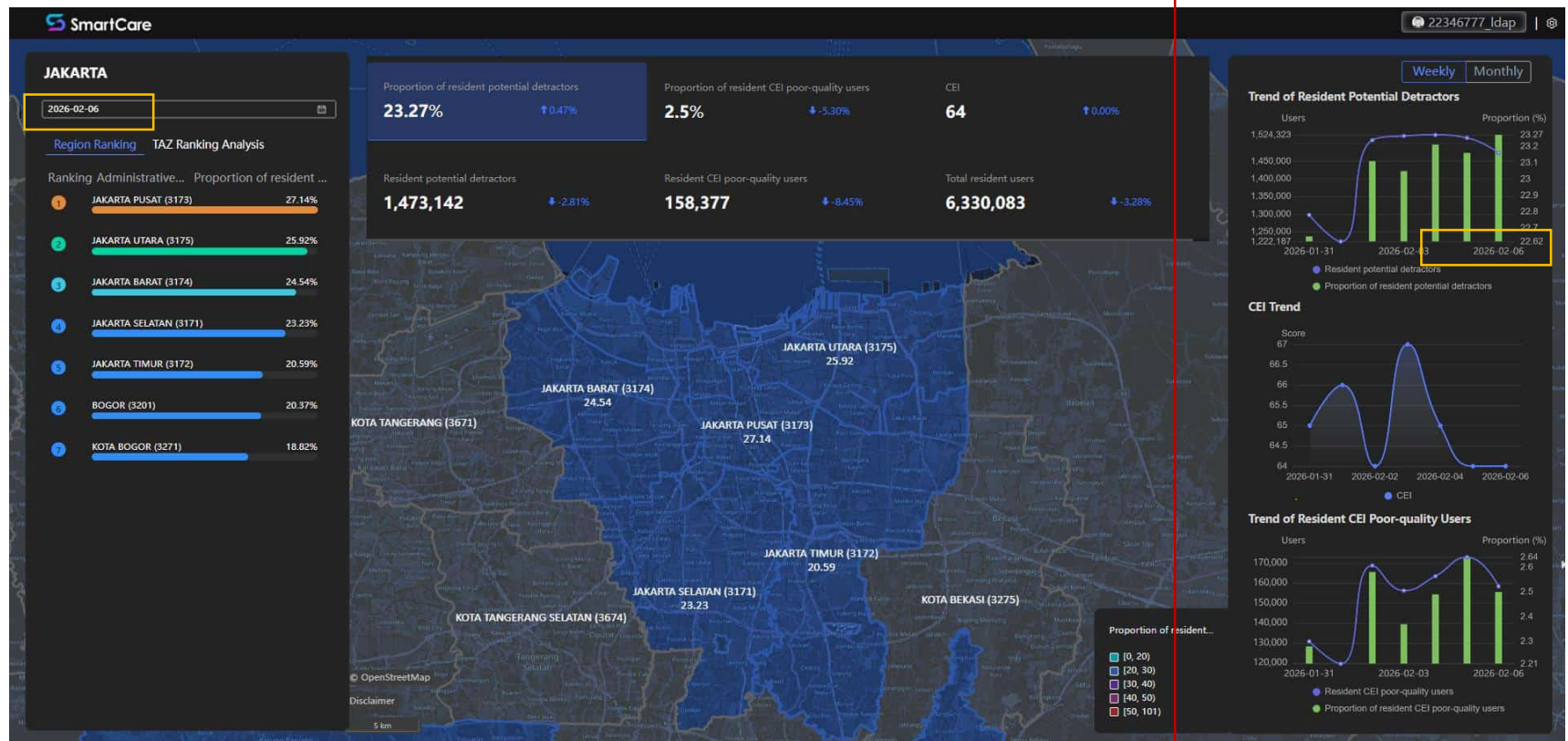
Service-specific Z-scores (stream, games, voip) accumulate the largest $|Z|$ deviations, indicating systematic transport or radio impairment.

Service Performance Monitoring & degradation Detection

Q: How does the System monitor mobile Service KPIs (e.g.: throughput, latency...) and detect performance degradation or anomalies?

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Awareness	Service Performance Monitoring & degradation Detection	10%	How does the System monitor mobile Service KPIs (e.g.: throughput, latency...) and detect performance degradation or anomalies?	The System continuously monitors mobile Service KPIs and detects anomalies or performance degradation, without human intervention.	The System monitors Service KPIs and detects anomalies or performance degradation based on predefined rules	Performance monitoring, Service degradation and anomaly detection are determined based on human expertise	

The System continuously monitors mobile service KPIs and detects anomalies or performance degradation without human intervention, synchronizing these results in real-time to the overall business dashboard.

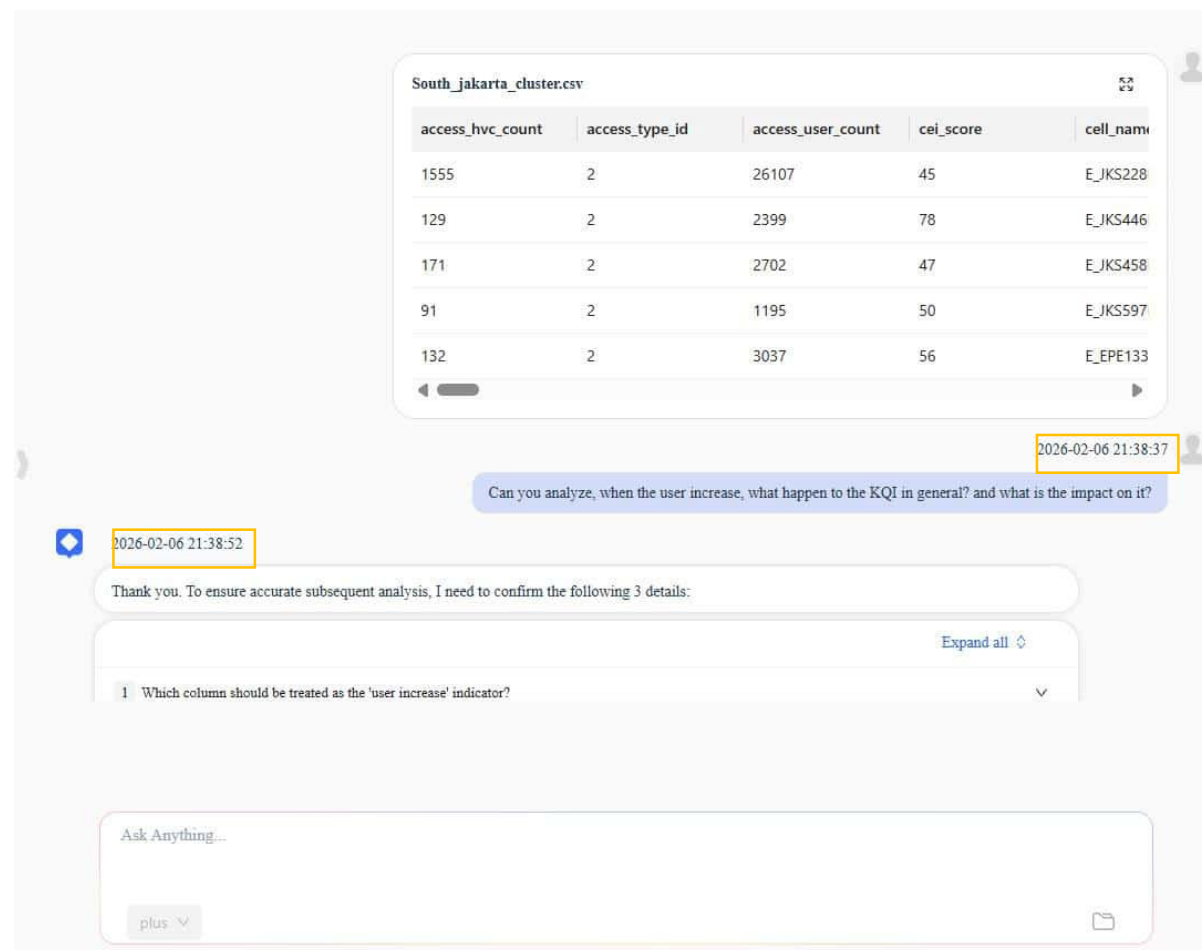


Service Performance Degradation Prediction

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Awareness	Service Performance Degradation Prediction	15%	How does the System predict Service performance degradation (e.g. Throughput, latency ...) and SLA violation before they affect Service performance?	The System uses AI Models to analyze mobile Service performance and predicts SLA violations before they impact the user.	The System uses dynamically programmable policies to analyze performance patterns and predicts potential SLA violations	The System predicts SLA violations based on pre-defined rules.	SLA violation is manually detected and addressed based on performance reports.

By importing historical data (e.g., January network datasets) and selecting business-specific descriptors, the AI generates deep operational insights.

When subscriber density increases at specific sites, the System **automatically monitors** indicators to ensure they remain within appropriate bounds. Operators can directly prompt the AI for **pre-impact predictions**.



South_jakarta_cluster.csv

access_hvc_count	access_type_id	access_user_count	cei_score	cell_name
1555	2	26107	45	E_JKS228
129	2	2399	78	E_JKS446
171	2	2702	47	E_JKS458
91	2	1195	50	E_JKS597
132	2	3037	56	E_EPE133

2026-02-06 21:38:37

Can you analyze, when the user increase, what happen to the KQI in general? and what is the impact on it?

2026-02-06 21:38:52

Thank you. To ensure accurate subsequent analysis, I need to confirm the following 3 details:

Expand all

1 Which column should be treated as the 'user increase' indicator?

Ask Anything...

plus

Service Performance Degradation Prediction



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- 03 RECOMMENDATIONS
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6 FEB 2026 CELL-LEVEL DETAIL

Three cells contributed the entire detractor pool, each registering 100 % detractor share with user counts ≤ 3 . All cells are transit-corridor sites, suggesting rush-hour signalling congestion or hand-over failure.

[top_cells_6_feb.csv](#) 

TOP CONTRIBUTING CELLS (6 FEB)

Filter rows...

CELL_NAME	KECAMATAN	DETRACTOR_PCT	USER_COUNT	LCEI_DETRACTOR_...
E_JSA115IL1_Mrtblokm...	KEBAYORAN BARU	100.0 	3	3
E_JSA115IE1_Mrtsising...	KEBAYORAN BARU	100.0 	1	1
E_JKS217IT1_Banknisp...	SETIABUDI	100.0 	1	1

SERVICE QOE IMPACT

Between 5 and 6 Feb, only instant-messaging QoE declined materially (-9.35 %). Web-page and file-sharing QoE slipped 1.13 % and 3.71 % respectively, while video, voice, and gaming QoE changed <1 %, corroborating a targeted IM strain.

INSTANT MESSAGING	-9.35%
FILE SHARING	-3.71%
WEB PAGE	-1.13%

[kpi_Svs6_feb.csv](#) 

Service Performance Degradation Prediction



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ANALYSIS PROCESS

TREND OVERVIEW

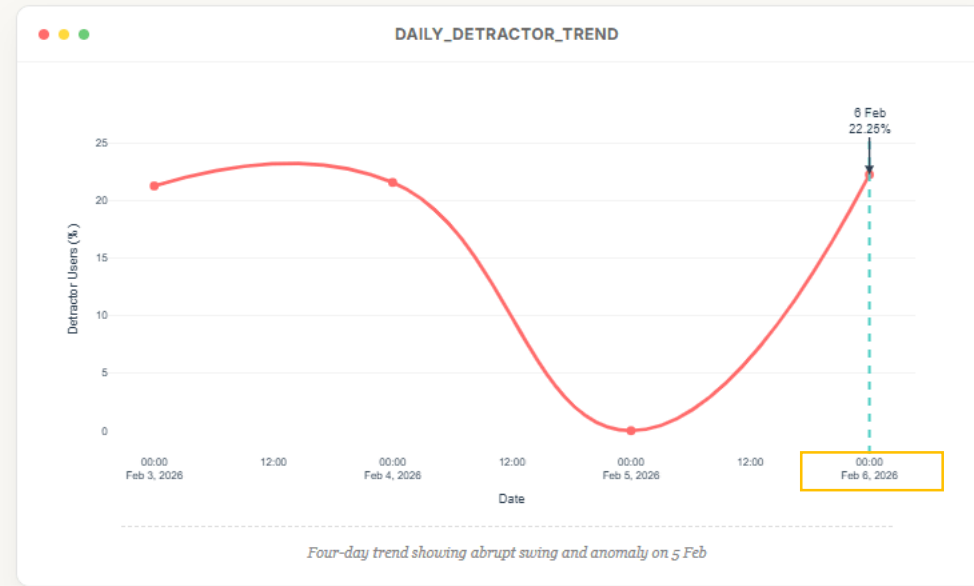
The four-day window shows an abrupt swing: 21.57 % on 4 Feb, 0 % on 5 Feb, and 22.25 % on 6 Feb. The zero reading on 5 Feb is inconsistent with adjacent days and warrants verification of OSS counter collection.

0%

5 FEB

22.25%

6 FEB



Service Performance Degradation Prediction



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CORE INSIGHTS

? DATA ARTEFACT DETECTION

The 5-February zero detractor count is likely a collection artefact; the 6-February rebound is concentrated in three low-user-count MRT cells with 100 % detractor ratio, consistent with micro-outages or RF interference during peak hours.

💡 SIGNALLING LOAD DIAGNOSIS

IM-specific QoS erosion implies signalling load rather than bearer saturation.

RECOMMENDATIONS

1 VALIDATE INTEGRITY

Validate CEI counter integrity for 5 Feb in OSS logs.

2 CONDUCT RF TESTS

Conduct RF drive tests on E_JSA115IL1 and E_JSA115IE1 to check for overshoot or external interference.

3 TRAFFIC STEERING

Enable IM traffic steering or bearer prioritisation during 07:00–09:00 to mitigate signalling congestion.




4 REAL-TIME ALERTING

Configure real-time alert when cell-level detractor_pct \geq 15 % to reduce mean time to respond.

OVERALL WORKFLOW

Service Performance Degradation Prediction

The System then returns a predictive report; upon opening it, users can view detailed conclusions regarding the projected network impact & which network KPIs might be influenced.

Impact of User Increase on KQI – South Jakarta Cluster

Executive Summary

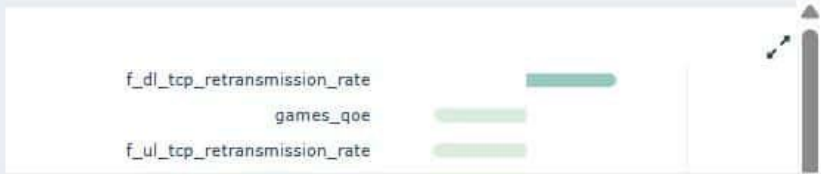
When daily user_count rises (0–1 308 range), **traffic-related KQIs scale proportionally** (Pearson p up to 0.78) while **latency and quality-of-experience metrics remain stable**. Regression estimates show each additional 100 users add **18.7 GB** to daily service traffic with **< 0.2 % change** in TCP re-transmission rates. No KQI exhibits statistically significant degradation once traffic volume is controlled.

Analysis Process

- Data Scope**
11 549 site-day samples from south_jakarta_cluster table, single day 2026-02-06
50 KQI numeric columns identified after excluding IDs, geo, and text fields
user_count range: 0 – 1 308 (median 95, Q3 187)
- Correlation Analysis**
Strongest positive correlations between user_count and traffic volume:

KQI	Pearson r
traffic_service_gb	0.780 🟡
web_page_traffic	0.777 🟡
stream_traffic	0.754 🟡
f_sharing_traffic	0.735 🟡
stream_zscore	0.706 🟡

corr_user_kqi.html



Service Performance Degradation Impact Analysis

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Analysis	Service Performance degradation Impact Analysis	10%	How does the System identify and analyze the impact of performance degradation (e.g., throughput, latency ...) on user experience or SLA compliance in the mobile network?	The System identifies and analyzes the impact of performance degradation, using AI models without human intervention.	The System identifies and analyzes the impact of mobile Service degradation using dynamically programable policies, but requires human confirmation to proceed.	The System identifies & analyzes impact of performance degradation, based on predefined rules	Impact of degradation is determined based on human expertise.



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CORE CONCLUSIONS

⚠ **RETRANSMISSION RATES SCALE WITH USER LOAD**

DL TCP re-transmission increases ~60 % from low- to high-load cells, indicating radio or scheduler congestion.

📉 **QOE DEGRADES VISIBLY**

Web and streaming QoE drop 15-22 %, breaching acceptable thresholds in the top quartile.

💡 **THROUGHPUT IMPACT IS SERVICE-SPECIFIC**

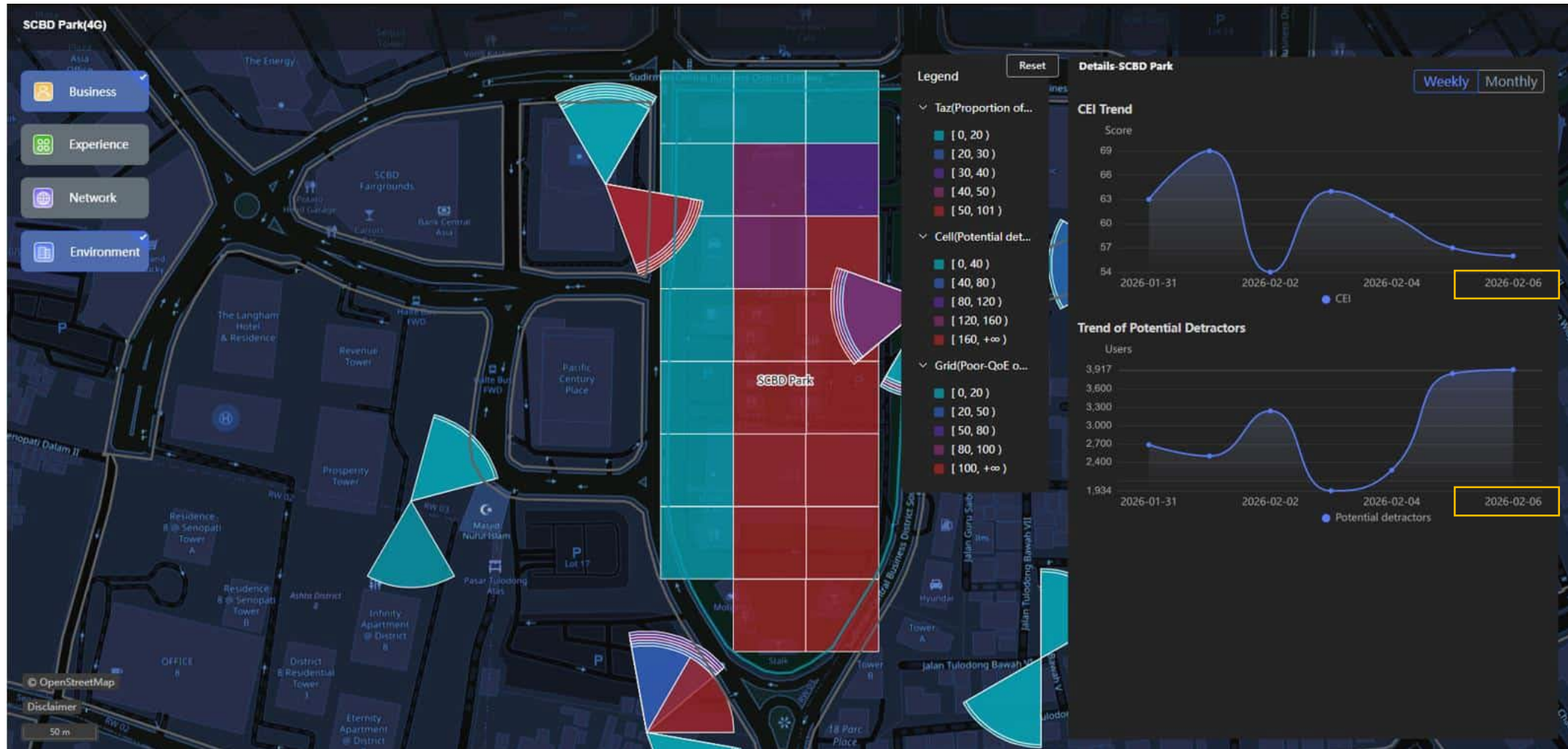
Streaming throughput falls 16 %, while web-page throughput declines only 2 %, suggesting video flows are more elastic to load.

⚙ **STATISTICAL SPREAD WIDENS**

Standard deviation of re-transmission metrics increases in high-load quartiles, flagging outliers needing immediate optimisation.

By opening the reports, the System identifies and analyzes the predicted impact of degradation on user experience. Within the generated report, the System provides **detailed predictive conclusions** on how performance shifts will affect SLA compliance and user satisfaction across the designated areas.

Service Performance Degradation Impact Analysis



In addition, the business dashboard also provides an analysis of the impact on the Service Performance Degradation Impact Analysis capability.

Following the Jakarta macro-region management previously demonstrated, the System enables deep-dive analysis from poorly performing areas down to Cell-level quality management. Within the system's visualization, the redder the table cells, the more severe the predicted service performance degradation. The System categorizes degradation impact into three predictive dimensions: Business, Experience, and Network.

Service Performance degradation Demarcation & Root Cause Analysis

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Analysis	Service Performance degradation Demarcation & Root Cause Analysis	10%	How does the System isolate the root cause of Service degradation across the network domains (i.e.: RAN, transport, and core)?	The System isolates and analyzes the root cause of mobile Service degradation across network domains using AI models, without human intervention.	The System isolates and analyzes the root cause of mobile Service degradation using dynamically programmable policies, but requires human confirmation.	The System isolates & analyzes performance degradation Root Cause, based on predefined rules	Performance data and alarms are manually analyzed to determine the root cause.

Real-time tracking Browser Reasoning Implementation Documents

Effect size (Cohen's d) and p-value from two-sample t-test on lcei_detractor_user_count.
Contribution share of each trigger metric to the deviation in detractor count (additive decomposition).
Top-1 trigger per analysis-group cell for grouping.

2.4. Tools to call

generate_db_schema_summary – confirm column list & sample values.
text_clustering – not needed (no free-text column).
time_series_plot_tool – not needed (single day).
plot_geographical_point – visualise cells coloured by Top-1 trigger (if lat/lon can be joined via external lookup; skip if unavailable).
plot_flowchart – final summary flowchart of whole RCA process.
report_refinement – polish final RCA report.

3. Todo list

Todo List

Data loading & validity screening

- Load 01_jakse_detractor for 2026-01-29 into pandas.
- Drop rows with missing cell_name, lcei_detractor_user_count, access_hvc_count.
- Cast numeric columns to float/int; flag impossible values (e.g., negative counts) and remove.

Define analysis vs control groups

- Create boolean column is_target = (lcei_detractor_user_count > 0) & (access_hvc_count > 0).
- Persist two cached tables: target_df, control_df.

Anomaly significance validation

- Run two-sample t-test (or Mann-Whitney U) on lcei_detractor_user_count between target & control.
- Compute Cohen's d and p-value; print interpretation.

Trigger metric candidate set

- Select 30+ network/QoE columns as candidate triggers (all *_delay, *_throughput, *_retransmission_rate, *_jitter, QoE scores, traffic, etc.).
- Build directed-graph sketch (on paper) mapping triggers → core metric for later visual.

Significance test per trigger

- For each candidate

✓ Time window for analysis
Selected: Single day (2/6/2026)

✓ Granularity of root-cause output
Selected: Per cell (cgisai)

2026-02-06 17:13:54

Thought for 13 min 46 sec >

Root-Cause Analysis Report

High-VIP (HVC) Detractor Cells – South Jakarta, 6 Feb 2026

Executive Summary

Problem Context: Single-day snapshot (6 Feb 2026) acr...

Root-Cause Analysis ...

View All Files >

Quote Link Like Comment

The System autonomously isolates the root cause of service degradation across network domains. Within the predictive report, **RCA results and remediation suggestions** are provided. By integrating with the business dashboard, users can **export detailed tables** to view specific root causes and granular diagnostic data.

Service Performance degradation Demarcation & Root Cause Analysis

Root-Cause Analysis Report

[Edit](#)

Key Insights

Streaming QoE degradation is geographically pervasive and tops the group-level Z-sum.

TCP retransmission features in 521 cells, indicating radio-quality issues.

No kecamatan is immune; however, **KEBAYORAN LAMA** contains the largest cluster of impacted cells.

Recommendations & Action Plan

Radio-layer sweep in **KEBAYORAN LAMA** focusing on CQI distribution and TCP retransmission rates.

Streaming CDN node health check and **initial congestion window tuning** for HTTP-based services.

QoE-based handover thresholds to retain HVC users on best-serving cells during busy hours.

Continuous per-cell monitoring using the attached `top1_trigger_per_cell.csv` for daily tracking.

Risk Control Warning

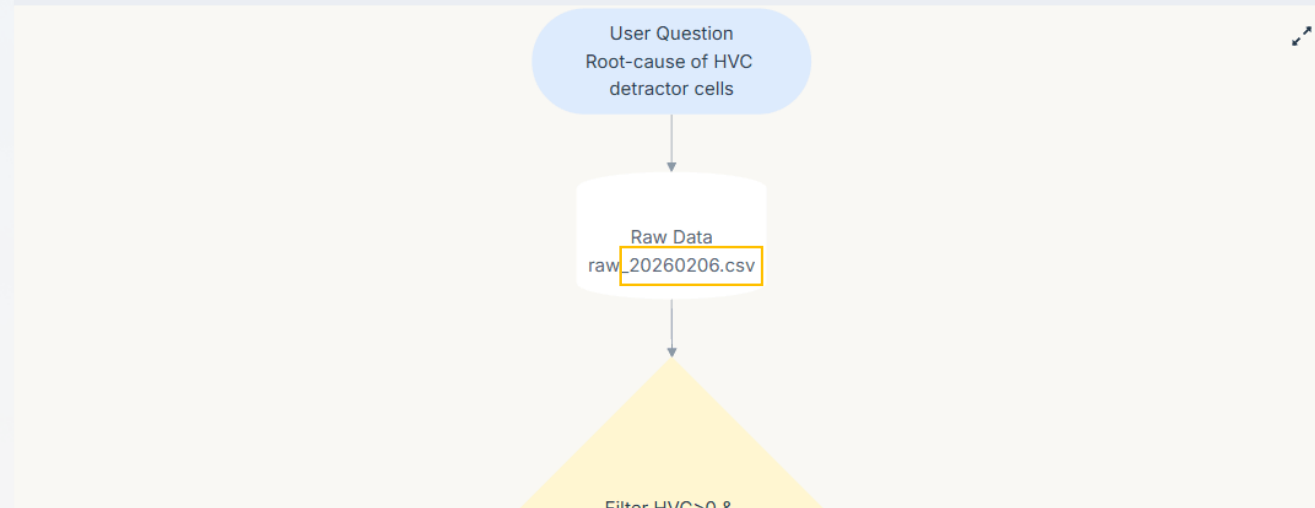
Analysis limited to single-day snapshot; temporal persistence of triggers should be validated over a 7-day rolling window before capital investment.

Data Lineage

All figures and tables are directly extracted from the files listed in `file_paths_nopy.txt`; no external data were introduced.

The complete analysis flowchart is as follows.

analysis_flowchart.html



Service Performance degradation Demarcation & Root Cause Analysis

Problem ID	UC Type	Objectid	DagID	L1causeID	L2causeID	L3causeID	Cause Category	Cause SubCategory	Reason	MOINFO	PMINFO
RIWO26010500009935700001	Worst Cell Management	144417-23	DXKL244G	10	1003	COPYPHQR_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance Load Intrafreq Neighbor		er Downlink Average Throughput (Mbps)(Mbps)", "1.99", [
RIWO26010500009935700001	Worst Cell Management	144417-23	DXKL244G	5	500	COPYZBAP_RPFTAU0W_FINAL	Resource Capacity	Radio Resource Limitation	Quality - Low Throughput High User		link Average Throughput (Mbps)(Mbps)", "2.74", [{"2026-0
RIWO26010500009935700001	Worst Cell Management	144417-23	DXKL244G	10	1000	R05BF7JB_FINAL	Network Structure	Overshooting Coverage	Self Overshoot);", "3.61", [{"2026-02-06 04:00:00", "CELL", "ENODEBID=1444
RIWO26010500009935700001	Worst Cell Management	144417-23	DXKL244G	6	604	RYZ4VPCJ_FINAL	Parameter Configuration	Scenario-Specific Parameter	Low Throughput - Improper Parameter	TYPE_EPF"]	, [wvnlk Average Throughput (Mbps)(Mbps)", "1.12", [{"202
RIWO26010500009935700001	Worst Cell Management	144417-23	DXKL244G	10	1003	COPYMZPV_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance CoSector		er Downlink Average Throughput (Mbps)(Mbps)", "1.99", [
RIWO26010500009935700001	Worst Cell Management	144417-23	DXKL244G	0	0	COPYPTOQ_RGJLEAVV_FINAL	Other Issue	Other Issue	High CCE Failure		ownlink Average Throughput (Mbps)(Mbps)", "4.12", [{"20
RIWO26010500009935700002	Worst Cell Management	144020-21	DXKL244G	10	1003	COPYMZPV_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance CoSector		er Downlink Average Throughput (Mbps)(Mbps)", "1.82", [
RIWO26010500009935700002	Worst Cell Management	144020-21	DXKL244G	10	1000	R05BF7JB_FINAL	Network Structure	Overshooting Coverage	Self Overshoot);", "3.12", [{"2026-02-06 05:00:00", "CELL", "ENODEBID=1440
RIWO26010500009935700002	Worst Cell Management	144020-21	DXKL244G	0	0	COPYPTOQ_RGJLEAVV_FINAL	Other Issue	Other Issue	High CCE Failure		ownlink Average Throughput (Mbps)(Mbps)", "3.12", [{"202
RIWO26010500009935700002	Worst Cell Management	144020-21	DXKL244G	10	1003	COPYPHQR_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance Load Intrafreq Neighbor		er Downlink Average Throughput (Mbps)(Mbps)", "1.82", [
RIWO26010500009935700003	Worst Cell Management	144365-41	DXKL244G	11	1101	RXD0TMJK_FINAL	Coverage and Quality	DL Weak Coverage	MR - Weak Coverage		ownlink Average Throughput (Mbps)(Mbps)", "4.14", [{"202
RIWO26010500009935700004	Worst Cell Management	144399-31	DXKL244G	10	1001	COPYSJZ2_RWISIGBH_FINAL	Network Structure	Overlapped Coverage	High PRB And Overlapped		ownlink Average Throughput (Mbps)(Mbps)", "2.22", [{"202
RIWO26010500009935700004	Worst Cell Management	144399-31	DXKL244G	0	0	COPYPTOQ_RGJLEAVV_FINAL	Other Issue	Other Issue	High CCE Failure		ownlink Average Throughput (Mbps)(Mbps)", "2.22", [{"202
RIWO26010500009935700004	Worst Cell Management	144399-31	DXKL244G	5	500	COPYGGMZ_RJ8SISJF_FINAL	Resource Capacity	Radio Resource Limitation	Engineering - High PRB Sector		er Downlink Average Throughput (Mbps)(Mbps)", "2.22", [
RIWO26010500009935700004	Worst Cell Management	144399-31	DXKL244G	10	1003	COPYMZPV_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance CoSector		er Downlink Average Throughput (Mbps)(Mbps)", "2.22", [
RIWO26010500009935700005	Worst Cell Management	144094-91	DXKL244G	10	1000	R05BF7JB_FINAL	Network Structure	Overshooting Coverage	Self Overshoot);", "3.76", [{"2026-02-06 07:00:00", "CELL", "ENODEBID=1440
RIWO26010500009935700005	Worst Cell Management	144094-91	DXKL244G	0	0	COPYPTOQ_RGJLEAVV_FINAL	Other Issue	Other Issue	High CCE Failure		ownlink Average Throughput (Mbps)(Mbps)", "3.48", [{"202
RIWO26010500009935700005	Worst Cell Management	144094-91	DXKL244G	6	604	RYZ4VPCJ_FINAL	Parameter Configuration	Scenario-Specific Parameter	Low Throughput - Improper Parameter	YPE_EPF"]	, [vnlk Average Throughput (Mbps)(Mbps)", "1.35", [{"2026
RIWO26010500009935700005	Worst Cell Management	144094-91	DXKL244G	5	500	COPYGGMZ_RJ8SISJF_FINAL	Resource Capacity	Radio Resource Limitation	Engineering - High PRB Sector		er Downlink Average Throughput (Mbps)(Mbps)", "1.45", [
RIWO26010500009935700005	Worst Cell Management	144094-91	DXKL244G	10	1003	COPYMZPV_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance CoSector		er Downlink Average Throughput (Mbps)(Mbps)", "1.45", [
RIWO26010500009935700005	Worst Cell Management	144094-91	DXKL244G	8	803	R3P706UV_FINAL	Signalling Procedure	Handover Failure	Quality - HO Dragging		ge Throughput (Mbps)(Mbps)", "3.76", [{"2026-01-05 07:00
RIWO26010500009935700006	Worst Cell Management	144881-31	DXKL244G	5	500	COPYGGMZ_RJ8SISJF_FINAL	Resource Capacity	Radio Resource Limitation	Engineering - High PRB Sector		er Downlink Average Throughput (Mbps)(Mbps)", "4.48", [
RIWO26010500009935700006	Worst Cell Management	144881-31	DXKL244G	10	1003	COPYMZPV_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance CoSector		er Downlink Average Throughput (Mbps)(Mbps)", "4.48", [
RIWO26010500009935700006	Worst Cell Management	144881-31	DXKL244G	10	1003	COPYPHQR_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance Load Intrafreq Neighbor		er Downlink Average Throughput (Mbps)(Mbps)", "4.48", [
RIWO26010500009935700006	Worst Cell Management	144881-31	DXKL244G	10	1000	R05BF7JB_FINAL	Network Structure	Overshooting Coverage	Self Overshoot);", "4.48", [{"2026-02-06 11:00:00", "CELL", "ENODEBID=1448
RIWO26010500009935700007	Worst Cell Management	144002-12	DXKL244G	0	0	COPYPTOQ_RGJLEAVV_FINAL	Other Issue	Other Issue	High CCE Failure		ownlink Average Throughput (Mbps)(Mbps)", "4.87", [{"202
RIWO26010500009935700007	Worst Cell Management	144002-12	DXKL244G	10	1003	COPYPHQR_R5FSS9SN_FINAL	Network Structure	Load Imbalance	Quality - Unbalance Load Intrafreq Neighbor		er Downlink Averaee Throughput (Mbps)(Mbps)", "2.28", [

Solution Generation

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Decision	Solution Generation	15%	How does the System generate solutions to address Service degradation in mobile Services based on root cause analysis	The System generates corrective actions to address mobile Service degradation and continuously learns from past resolutions using AI models, without human intervention.	The System generates corrective actions using dynamically programmable policies based on prior resolutions but requires human confirmation before execution.	The System suggests corrective actions based on predefined rules.	Solutions are manually created based on human expertise




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CORE CONCLUSIONS

⚠ RETRANSMISSION RATES SCALE WITH USER LOAD

DL TCP re-transmission increases ~60 % from low- to high-load cells, indicating radio or scheduler congestion.

📉 QOE DEGRADES VISIBLY

Web and streaming QoE drop 15-22 %, breaching acceptable thresholds in the top quartile.

💡 THROUGHPUT IMPACT IS SERVICE-SPECIFIC

Streaming throughput falls 16 %, while web-page throughput declines only 2 %, suggesting video flows are more elastic to load.

🔗 STATISTICAL SPREAD WIDENS

Standard deviation of re-transmission metrics increases in high-load quartiles, flagging outliers needing immediate optimisation.

RECOMMENDATIONS

🚀 CAPACITY-FIRST OPTIMISATION

Prioritise additional carriers or small-cell in-fill at cells whose user count sits in the **top quartile** and re-transmission > 1 %.

🔗 SCHEDULER TUNING

Investigate DL RLC re-segmentation and outer-loop link-adaptation settings where re-transmission delta exceeds +50 %.

📍 QOE GUARD-RINGS

Enable adaptive video-bit-rate throttling or TCP-proxy buffering when **access_user_count** crosses the **75th-percentile** threshold observed per sub-district.

Based on the identified root cause, the System **generates several key corrective actions** to address the service degradation. This process leverages AI models to ensure the solutions are tailored to the specific cross-domain issue identified.

Solution Evaluation & Decision making

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Decision	Solution Evaluation & Decision making	20%	How does the System evaluate solution and decide on the best solution to implement ?	The System evaluates multiple remediation options, analyzes risk and trade-offs, and selects the best solution using AI models, without requiring human decision-making.	The System assesses remediation options using dynamically programmable policies and recommends the optimal choice, but requires human approval.	Remediation options, risk assessment and selection of appropriate solutions are manually done	

Object Name	Object ID	Object Type	RAT	Vendor	Problem Type	Symptom Started At	Auto Diagnostic Status	Auto Diagnosis Result	Auto Decision Status	Auto Decision
E_JKU082MR1_Greenbayapartment-MAC_MR02	135082-63	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
N_EPE223EL1_JKU111_KerapuPenjaringan_EL17	135111-71	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKU082ML1_Greenbayapartment-MAC_ML02	135082-61	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKB169TL1_Kosambikldrs_TL11	131169-11	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKU292HT1_JlinspeksiBTSH-TBG_HT01	135292-12	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKU292HL1_JlinspeksiBTSH-TBG_HL01	135292-11	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
C_JBX253VE1_Aptgreenparkviewf-MAC_VE02	621253-24	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Not Matched
E_JKB722MT1_Citragadensity2-STP_MT03	131722-32	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Not Matched
E_JBX284MT1_Relocsetia7Cengkareng-PTI_MT01	621284-12	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKU533MT1_Bandenganutr_MT01	135533-12	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKB817VE1_Jalandasapegadungan-TBG_VE03	131817-34	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Not Matched
E_JKP950MT1_Hoteldias-STP_MT01	132950-12	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKP950ML1_Hoteldias-STP_ML01	132950-11	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JBX279HL1_JlgununggalungngryBTSH-TBG_HL03	621279-31	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JKU292HE1_JlinspeksiBTSH-TBG_HE01	135292-14	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Not Matched
E_JKU292HR1_JlinspeksiBTSH-TBG_HR01	135292-13	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched
E_JBX099ML1_RAYADAANMOGOT-IBS_ML03	621099-31	CELL	LTE	HUAWEI	High Loading	2026-01-26 00:00:00	Success	Matched	Success	Matched

The System evaluates multiple remediation options by simulating potential outcomes. It provides **forecasted results for each implementation** (e.g., "Predicted gain for Solution 1") and **autonomously recommends Option 1** as the best solution based on risk and trade-off analysis, without requiring human decision-making.

Solution Evaluation & Decision making

	Q	R	S	T	U	V	W
314	E_JKB169TL1_Kosambikldrs_TL11	CELLCQIADJALGO	LTE	MOD	LOCALCELLID	11	INITDELTAQCI
315	E_JKB169TL1_Kosambikldrs_TL11	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	11	HIGHBLERTARGETTBSIDXTHLD
316	E_JKB169TL1_Kosambikldrs_TL11	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	11	CQIADJINITIALSTEP
317	E_JKB169TL1_Kosambikldrs_TL11	CELLALGOSWITCH	LTE	MOD	LOCALCELLID	11	CQIADJALGOSWITCH
318	E_JKU082ML1_Greenbayapartment-MAC_ML02	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	61	CQIADJINITIALSTEP
319	E_JKU082ML1_Greenbayapartment-MAC_ML02	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	61	HIGHBLERTARGETTBSIDXTHLD
320	E_JKU082ML1_Greenbayapartment-MAC_ML02	CELLALGOSWITCH	LTE	MOD	LOCALCELLID	61	CQIADJALGOSWITCH
321	E_JKU082ML1_Greenbayapartment-MAC_ML02	CELLCQIADJALGO	LTE	MOD	LOCALCELLID	61	INITDELTAQCI
322	N_EPE223EL1_JKU111_KerapuPenjaringan_EL17	CELLCQIADJALGO	LTE	MOD	LOCALCELLID	71	INITDELTAQCI
323	N_EPE223EL1_JKU111_KerapuPenjaringan_EL17	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	71	HIGHBLERTARGETTBSIDXTHLD
324	N_EPE223EL1_JKU111_KerapuPenjaringan_EL17	CELLALGOSWITCH	LTE	MOD	LOCALCELLID	71	CQIADJALGOSWITCH
325	N_EPE223EL1_JKU111_KerapuPenjaringan_EL17	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	71	CQIADJINITIALSTEP
326	E_JKU082MR1_Greenbayapartment-MAC_MR02	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	63	HIGHBLERTARGETTBSIDXTHLD
327	E_JKU082MR1_Greenbayapartment-MAC_MR02	CELLDLSCHALGO	LTE	MOD	LOCALCELLID	63	CQIADJINITIALSTEP
328	E_JKU082MR1_Greenbayapartment-MAC_MR02	CELLCQIADJALGO	LTE	MOD	LOCALCELLID	63	INITDELTAQCI
329	E_JKU082MR1_Greenbayapartment-MAC_MR02	CELLALGOSWITCH	LTE	MOD	LOCALCELLID	63	CQIADJALGOSWITCH
330							
331							
332							
333							
334							
335							
336							
337							
338							

Solution Implementation

Cognitive Activity	Service Capability	Weight	Questions	Option A	Option B	Option C	Option D
Execution	Solution Implementation	10%	How does the System implement solution and apply fallback mechanisms in case of solution failure?	The System implements the selected corrective action and triggers fallback mechanisms in case of failure, without human intervention	The System applies corrective action and fallback mechanisms using pre-defined rules, based on human approval.	Implementation and fallback handling are manually executed	

The System **automatically implements the selected script** while simultaneously monitoring relevant KPIs. If the System identifies any KPI anomalies post-implementation, it **automatically triggers fallback mechanisms** to restore the network state, completing the closed-loop without human intervention.

```

1- {
2-   "trackingId": "3f09af0e-d5c2-4b9f-b849-7567ec0beb71"
3- }

```

Ln: 2 Col: 54

Response

Output Log

```

14-   "distributedTask": false,
15-   "taskName": "testing_RAN_Parameter",
16-   "id": 3379787,
17-   "lastModified": "2025-12-01T23:28:22.256+07:00",
18-   "state": "COMPLETED",
19-   "taskId": 4194,
20-   "events": {
21-     "timestamps": {
22-       "RECEIVED": 1764606489807,
23-       "COMPLETED": 1764606502256,
24-       "QUEUED": 1764606489788,
25-       "STARTED": 1764606491177,
26-       "ERROR": -1,

```

Ln: 1 Col: 1

```

--- Written to server (20260206 19:56:33) -----
MOD CELLALGOSWITCH:LOCALCELLID=12,DLSCHSWITCH=FREQSEL SWITCH=0;

--- Read from server (20260206 19:56:33) -----
+++   E_PLG407_TegalBinangun2-DMT      2026-02-06 19:56:32
O&M   #808477079
%%/*1885134394*/MOD CELLALGOSWITCH:LOCALCELLID=12,DLSCHSWITCH=FREQSEL SWITCH=0;%%
RETCODE = 0 Operation succeeded.

--- END

--- Written to server (20260206 19:56:33) -----
MOD CELLDLSCHALGO:LOCALCELLID=12,RBGALLOCSTRATEGY=0,RBPRIMCSSELECTRATIO THD=0;

--- Read from server (20260206 19:56:33) -----
+++   E_PLG407_TegalBinangun2-DMT      2026-02-06 19:56:33
O&M   #808477080
%%/*1885134396*/MOD CELLDLSCHALGO:LOCALCELLID=12,RBGALLOCSTRATEGY=0,RBPRIMCSSELECTRATIO THD=0;%%
RETCODE = 0 Operation succeeded.

--- END

```

Solution Implementation

More evidence for auto execution Log

```

1,"status":"EXECUTED","updateTime":"2026-02-06T16:37:23.395Z","attributes":[{"name":"a1a2SearchThresholdRsrp","suppliedValue":"-108"}]},{
"fdn":"SubNetwork=ONRM_ROOT_MO,SubNetwork=LTE_EnodeB,MeContext=BGE036MM2-PINTUSONA,ManagedElement=BGE036MM2-PINTUSONA,ENodeBFunction=
1,EUtranCellFDD=BGE036MF1,UeMeasControl=1,ReportConfigA5=
1,"status":"EXECUTED","updateTime":"2026-02-06T16:37:23.396Z","attributes":[{"name":"a5Threshold1Rsrp","suppliedValue":"-97"}]},{
"fdn":"SubNetwork=ONRM_ROOT_MO,SubNetwork=LTE_EnodeB,MeContext=BGE036MM2-PINTUSONA,ManagedElement=BGE036MM2-PINTUSONA,ENodeBFunction=
1,EUtranCellFDD=BGE036ME1,UeMeasControl=1,ReportConfigSearch=
1,"status":"EXECUTED","updateTime":"2026-02-06T16:37:23.396Z","attributes":[{"name":"a1a2SearchThresholdRsrp","suppliedValue":"-108"}]},{
"fdn":"SubNetwork=ONRM_ROOT_MO,SubNetwork=LTE_EnodeB,MeContext=BGE036MM2-PINTUSONA,ManagedElement=BGE036MM2-PINTUSONA,ENodeBFunction=
1,EUtranCellFDD=BGE036MF1,UeMeasControl=1,ReportConfigA5=
1,"status":"EXECUTED","updateTime":"2026-02-06T16:37:23.397Z","attributes":[{"name":"a5Threshold1Rsrp","suppliedValue":"-97"}]},{
"href":"https://\\ran9enm01.telkomsel.co.id\\bulk-configuration\\v1\\import-jobs\\jobs\\47870\\operations?offset=0&limit=250
&expand=failures&expand=attributes"},"self":{"rel":"self","href":"https://\\ran9enm01.telkomsel.co.id\\bulk-configuration\\v1\\import-jobs\\jobs\\47870
\\operations?offset=0&limit=250&expand=failures&expand=attributes"},"job":{"rel":"job","href":"https://\\ran9enm01.telkomsel.co.id\\bulk-configuration\\v1
\\import-jobs\\jobs\\47870?expand=failures&expand=attributes"},"first":{"rel":"first","href":"https://\\ran9enm01.telkomsel.co.id\\bulk-configuration\\v1
\\import-jobs\\jobs\\47870\\operations?offset=0&limit=250&expand=failures&expand=attributes"}}}

```

KPI-based rollback switch:	On
Relative Threshold for Call Drop Rate deterioration within the whole day:	2
Relative Threshold for RRC Setup Success Rate deterioration within the whole day:	0.2
Relative Threshold for E-RAB Setup Success Rate deterioration within the whole day:	0.2
Relative Threshold for Intra-frequency Handover Out Success Rate deterioration within the whole day:	0.2
Relative Threshold for Inter-frequency Handover Out Success Rate deterioration within the whole day:	0.2
Relative Threshold for Downlink Average Throughput deterioration within the whole day:	2

For scenarios where optimization fails to meet expectations, the System utilizes a pre-defined KPI-based rollback mechanism; if the post-configuration KPIs fail to reach the designated thresholds, a rollback is automatically triggered to restore the previous stable network state.

Thank you