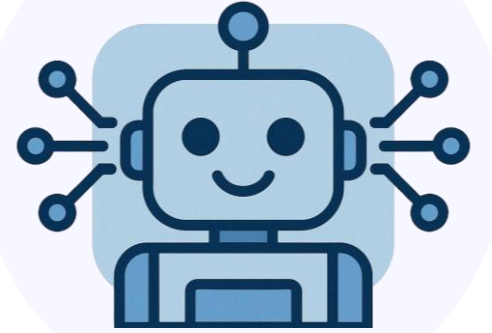


Building an AI/LLM Agent for 5G Network Troubleshooting



Telco Troubleshooting Agentic Challenge

ZiND!

GSMA™

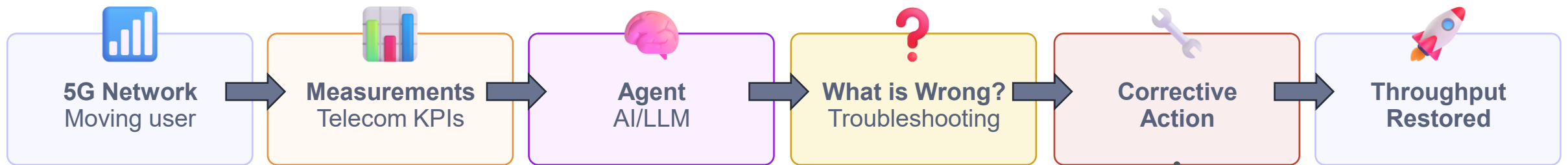


HUAWEI



The Challenge

Given a **degraded 5G scenario**, can an agent automatically identify the corrective actions that restore performance?



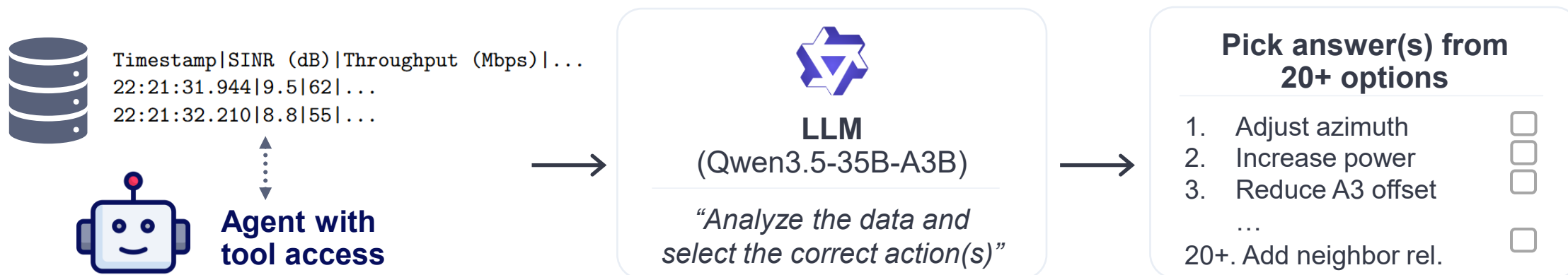
- 2000 training scenarios
- 500 test scenarios (Round 1)
- 500 test scenarios (Round 2)
- 20+ candidate actions per scenario
- 1 or multiple correct answers

Choice 1: Increase A3 Offset threshold for base station 4 by 3 dB
Choice 2: Press down the tilt angle of base station 3 by 5 degrees
Choice 3: Add neighbor relationship between base station 3 and 4
....

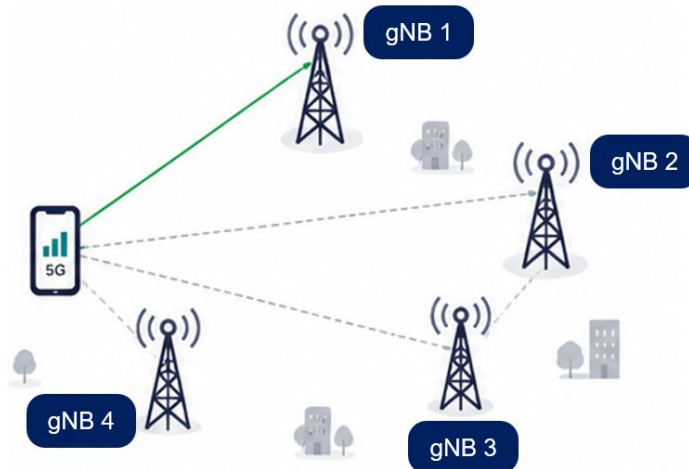
Scenario ID	Answer
1	C13
2	C2 C8 C17 C19
...	...

Ask the LLM Everything

First Naïve Approach



Network data
retrieved via
5G-specific tools

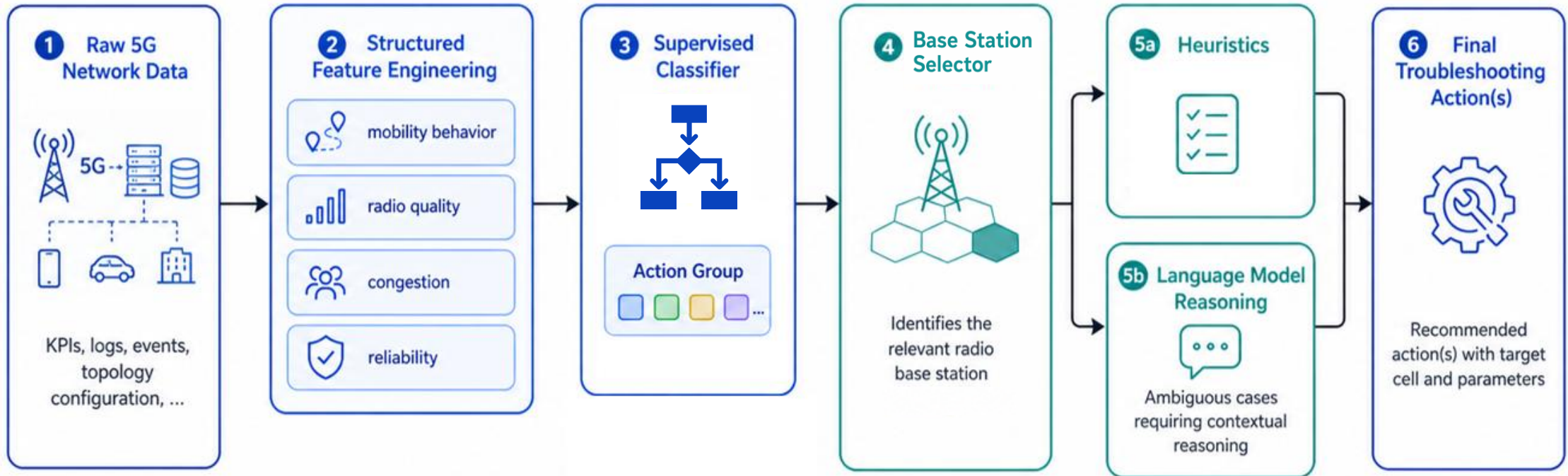


-  Configuration data
-  User plane data
-  KPI data
-  Measurement report data
-  Signaling event logs

✗ DIDN'T WORK: Too much data, too little structure for the model

A Hybrid Troubleshooting Agent

Decomposing the challenge into multiple decisions



Gather evidence from multiple network planes

Reduce noise & expose telecom-specific patterns

Reduce decision space from 20+ actions to 10 categories

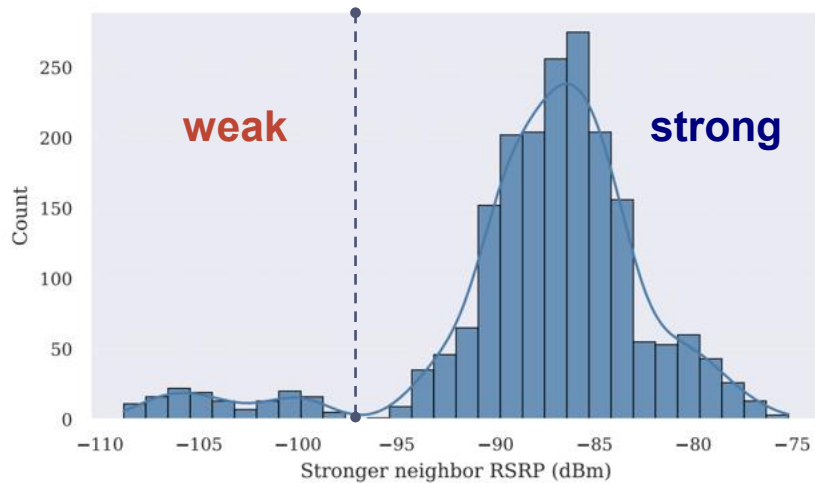
Identify which base station is responsible

Most scenarios resolved before this stage

Raw Measurements → Diagnostic Indicators

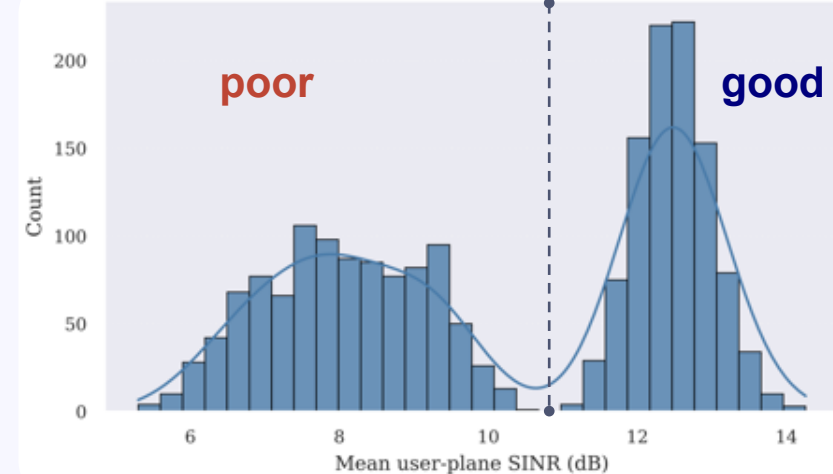
Feature Engineering

Strongest-neighbor cell signal strength (RSRP)



*Is there a viable
handover candidate?*

User-plane signal quality (SINR)



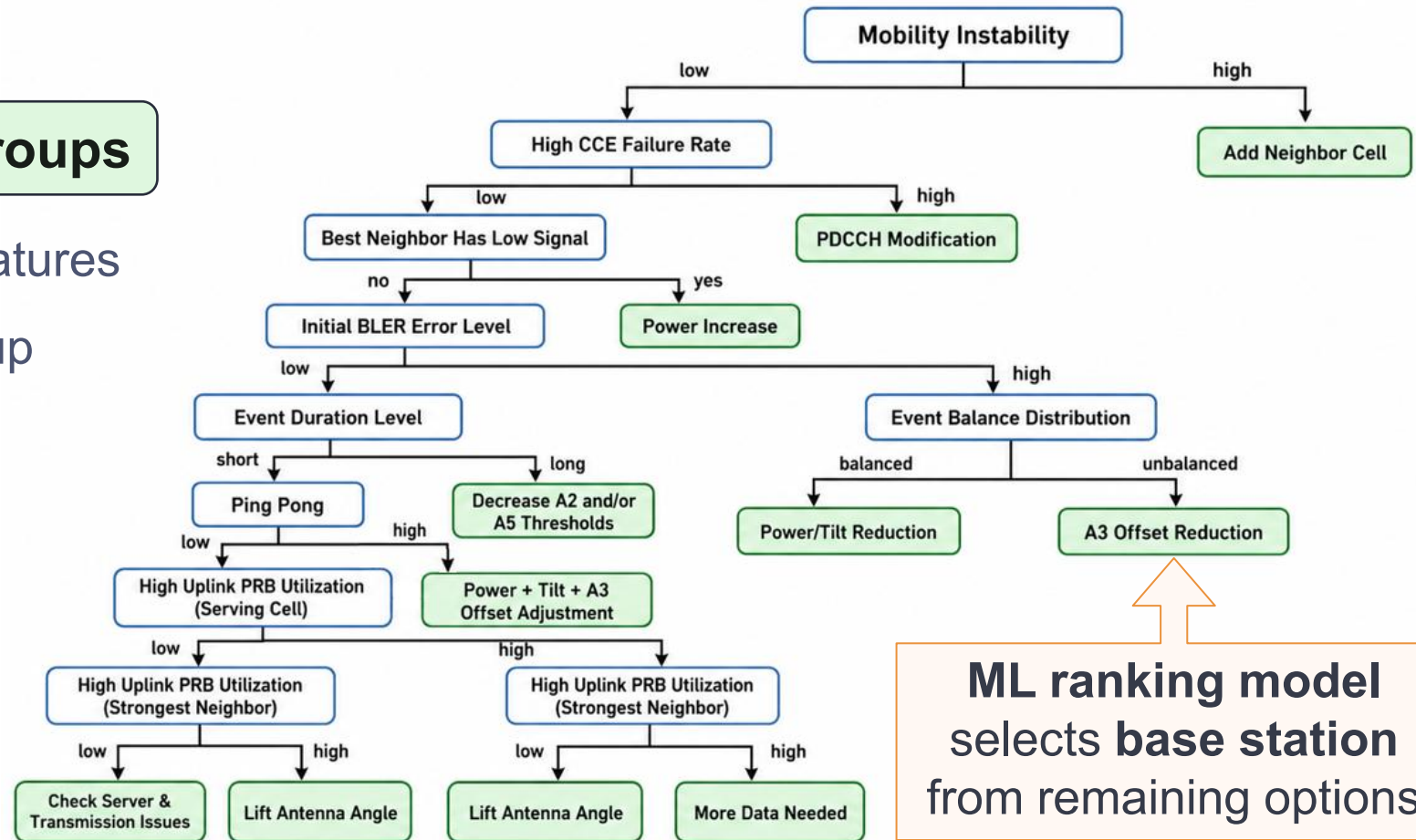
*Clean coverage or
interference-limited operation?*

- Telecom KPIs often show **distinct, well-separated operating regimes**
- Feature engineering condenses signals into compact **indicators that capture these regimes**

Decision Logic for Troubleshooting Actions

Classification over action groups

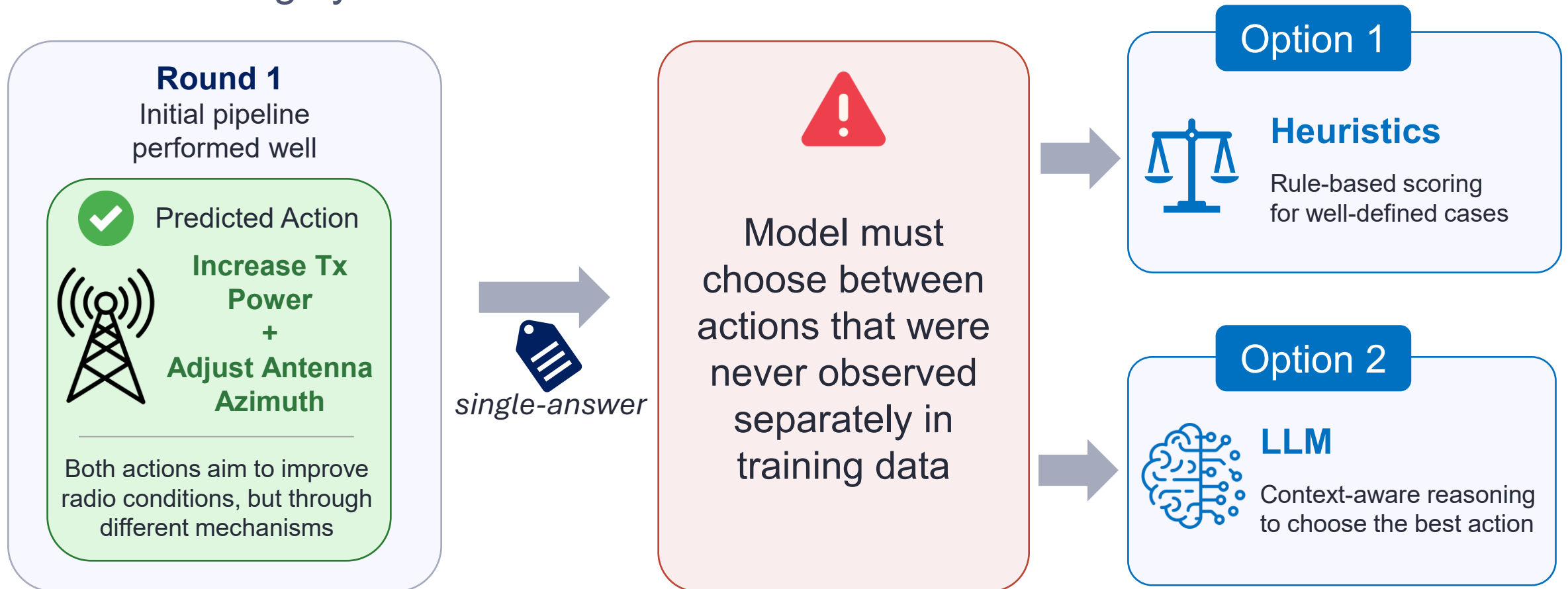
- *Input*: engineered telecom features
- *Output*: corrective action group
- *Model*: binary decision tree



Round 1 – 100% accuracy on test set

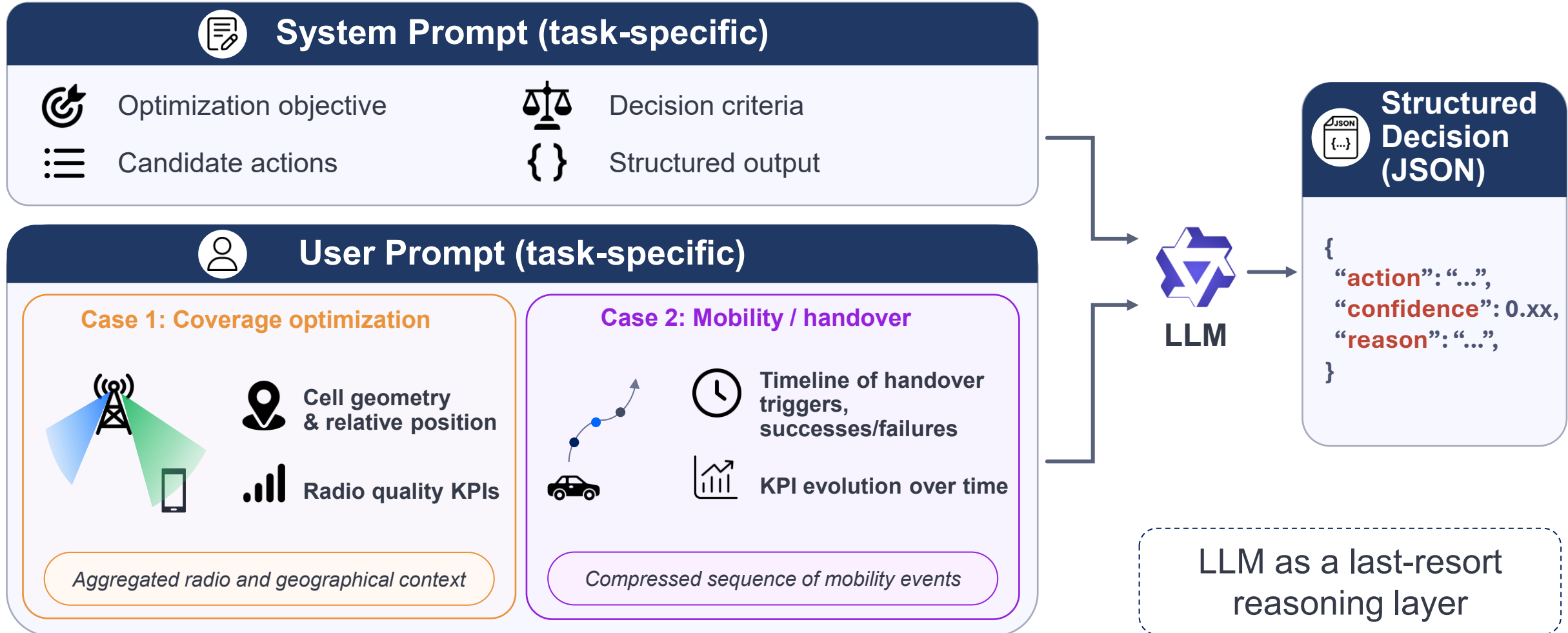
Handling Ambiguous Action Groups

Round 2 introduces ambiguity that requires extending the fixed decision pipeline into a reasoning system.



LLM-Assisted Ambiguity Resolution

Context-aware prompts tailored to the specific action group



Lessons from Round 2

When the assumptions learned during training no longer hold



Edge cases & Inconsistencies

Scenarios & patterns not seen in training data



Ambiguous actions

More than one valid action or competing options



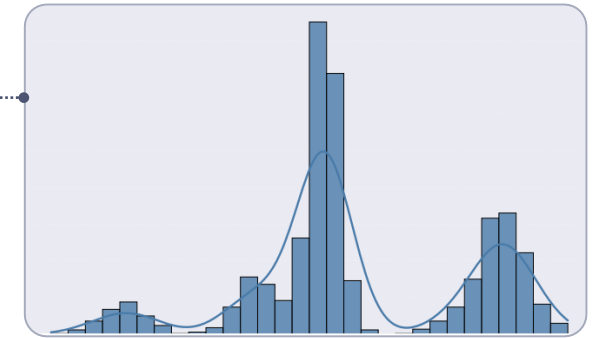
Multiple valid explanations

Different root causes can explain the same observations



Single-pass reasoning

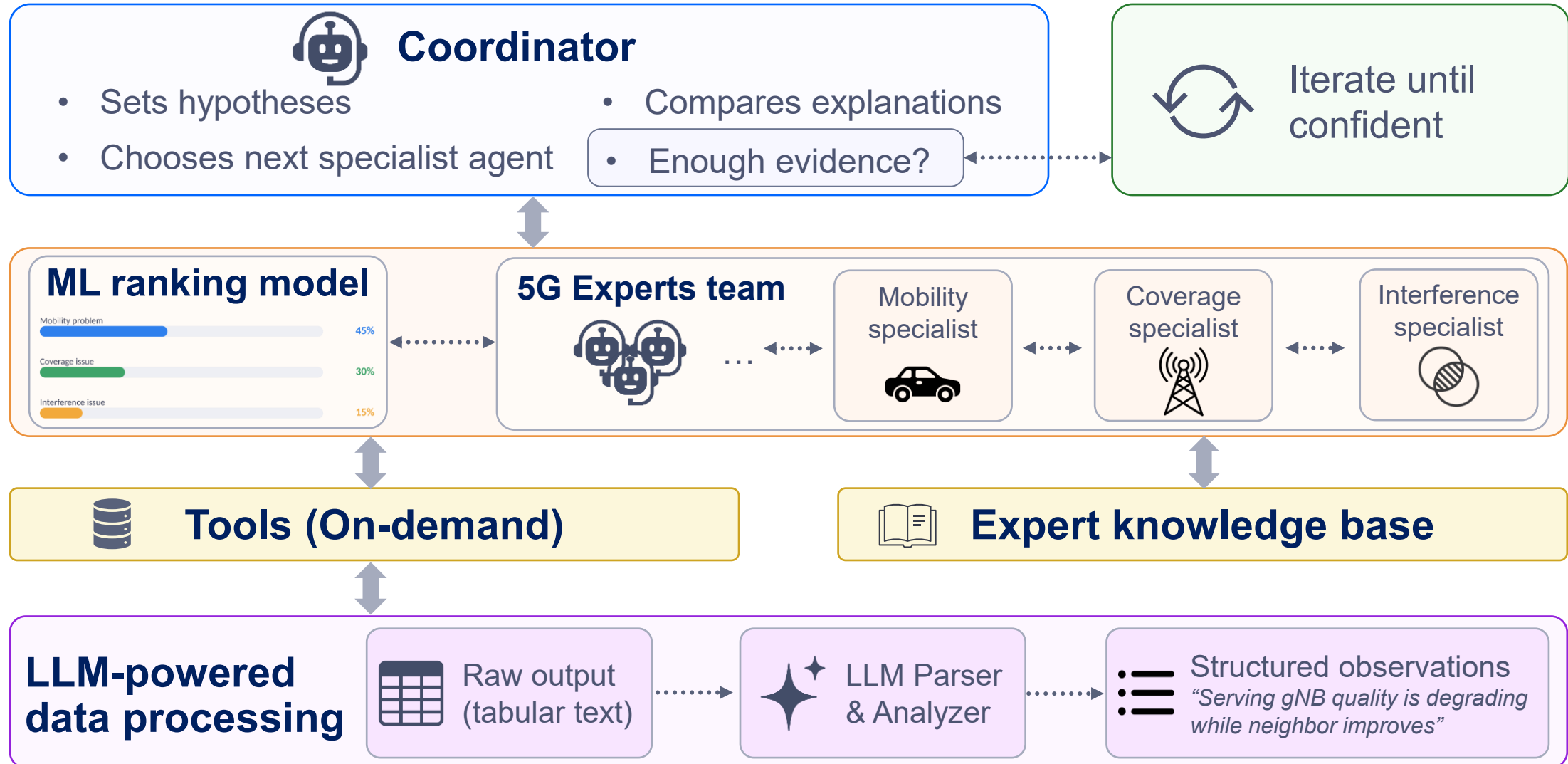
Late LLM fallback limits adaptation



Accuracy
100% → 44%

Need for a more adaptative
troubleshooting agent

Rethinking Agentic 5G Troubleshooting



Concluding Thoughts



Domain knowledge still matters

Telecom features + ML remain powerful



LLMs complement classical ML

Add value on ambiguous cases, not a replacement for structured models



Future of telecom troubleshooting

Smarter integration of ML, expert knowledge, and adaptive reasoning



Telefónica

thank you



liesbeth.roelens@telefonica.com



This work has been partially supported by the European Union's Horizon Program through the 6G Data and ML operations automation via an end-to-end AI framework (**6G-DALI**) Project under Grant 101192750.