**Custom Monitoring Dashboards & KPI Visualizations**

**Title:** *Real-Time & Historical Analytics Dashboards for 5G Network KPIs*

**A. Objectives**

Provide network operators and management with intuitive dashboards displaying key performance indicators (KPIs) such as throughput, latency, packet loss, energy consumption, and algorithm effectiveness.

**B. Dashboard Features**

| **Dashboard Name** | **Primary Metrics** | **Data Sources** | **Users** |
| --- | --- | --- | --- |
| **Real-Time Network Health** | Latency, packet loss, active users, throughput | Prometheus, Kafka Streams | NOC Engineers, Ops Managers |
| **Optimization Impact** | Power consumption, algorithm decisions, SLA compliance | AI engine logs, telemetry DB | Network Engineers, Analysts |
| **Historical Trends & Forecasts** | Traffic growth, fault rates, energy usage trends | Time-series DB (InfluxDB, TSDB) | Network Planning, Execs |
| **Anomaly Detection Alerts** | Detected anomalies, severity, resolution status | SIEM, AI monitoring tools | Security Teams, NOC |

**C. Technology Stack**

* **Visualization:** Grafana, Kibana, Tableau, Power BI
* **Data Query:** SQL, PromQL, Elasticsearch queries
* **Alerting:** Integrated with PagerDuty, Slack, email for automated notifications
* **Custom Widgets:** Interactive heatmaps, geo-maps, drill-down charts

**D. Dashboard Design Principles**

* Use color coding and thresholds to highlight SLA violations.
* Support filtering by region, cell site, or time period.
* Provide export options (CSV, PDF) for reports.
* Ensure mobile accessibility for field engineers.