Rimedo Labs: Traffic Steering rApp
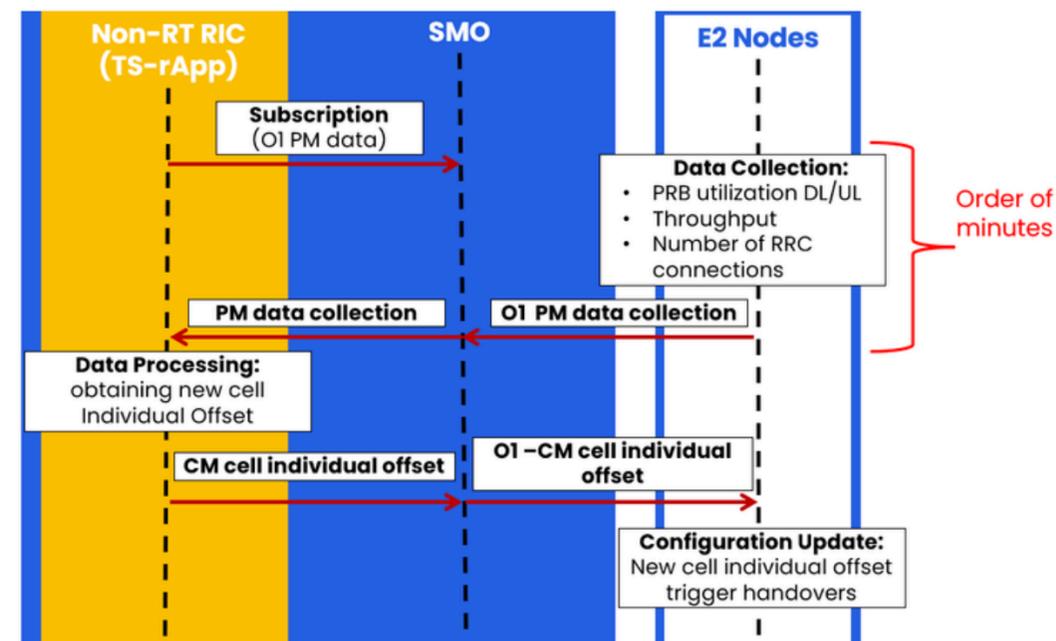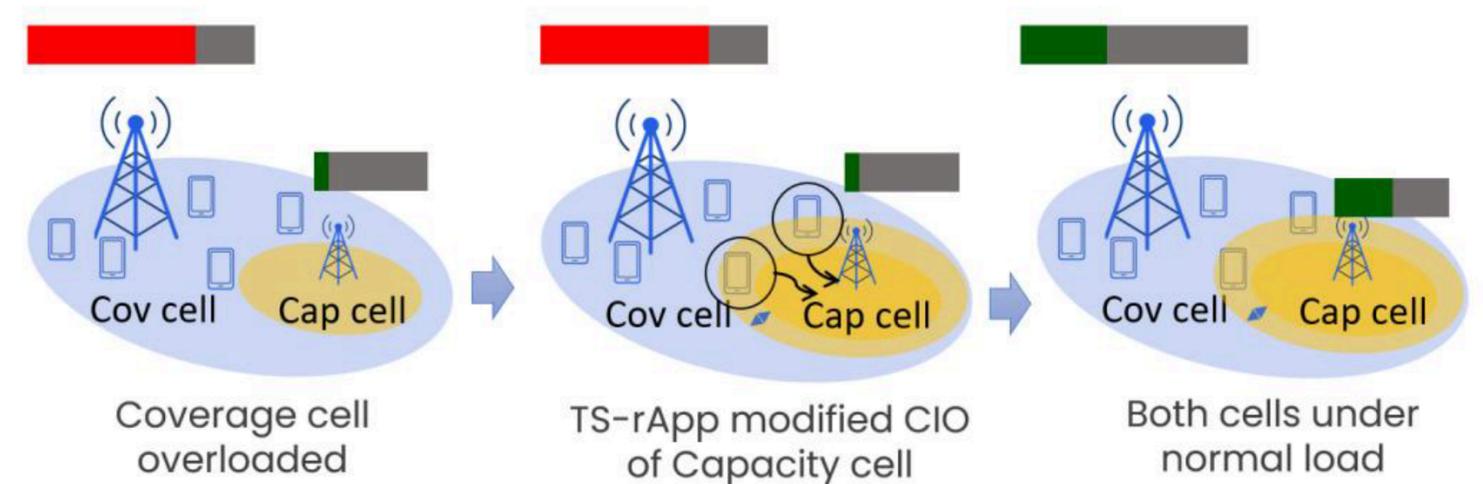
Brief introduction

Rimedo Labs Traffic Steering rApp is an intelligent O-RAN application designed to optimize traffic distribution in mobile networks. Operating within the Non-Real-Time RIC, it dynamically manages coverage parameters and steering policies to maximize radio resource utilization and ensure superior service quality across 4G and 5G networks.

Setting the scene

Modern radio networks face high traffic volatility. Frequently, some cells suffer congestion and service degradation while neighboring base stations remain underutilized. Static handover configurations cannot adapt to dynamic user behavior or diverse service requirements like eMBB or V2X. Operators require an automated solution that continuously monitors network health and adapts configurations to smooth out load peaks without expensive physical infrastructure upgrades.

Introduction to solution

The Traffic Steering rApp addresses these challenges by introducing an automated load management loop. The application leverages Performance Management (PM) data via the O1 interface to construct a holistic view of network load. It intelligently modifies Cell Individual Offsets (CIO), indirectly steering user devices to the best-suited nodes. Additionally, it integrates with real-time applications (xApps) by sending control policies via the A1 interface, enabling advanced scenarios like emergency service prioritization or autonomous vehicle traffic optimization.

Coverage cell overloaded → TS-rApp modified CIO of Capacity cell → Both cells under normal load

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Rimedo Labs: Traffic Steering rApp

Traffic Steering for short-period scenarios

Traffic Management for V2X scenarios

Traffic Steering for long-period scenarios

Explanation of the solution

Rimedo Labs Traffic Steering rApp implements advanced Radio Resource Management (RRM) within the O-RAN architecture. The solution operates in a closed control loop hosted on the Non-RT RIC.

First, the application aggregates and analyzes Key Performance Indicators (KPIs) such as Downlink/Uplink PRB utilization, user throughput, and active RRC connection counts. This data is cyclically retrieved via the O1 interface. The algorithm identifies load imbalances between neighboring cells and calculates optimal Cell Individual Offset (CIO) values. These updated configurations are pushed to E2 nodes (O-CU/O-DU), effectively shifting cell coverage boundaries to offload edge users to less congested stations.

Simultaneously, the rApp utilizes the A1 interface to manage policies for the Traffic Steering xApp residing in the Near-RT RIC. This enables "Service-Based Traffic Steering," where specific service types (e.g., Voice, Video, V2X) are directed to dedicated network layers (e.g., coverage vs. capacity bands). This two-tier architecture ensures that global decisions made by the rApp align with rapid decisions made by the xApp, eliminating the risk of oscillation and conflict in traffic management.

Average PrbUsedDl per cell (with/without TS rApp)

Average: without TS rApp: 0.22 Mbps, TS rApp: 0.25 Mbps

Key benefits

- **Maximized Spectral Efficiency:** By balancing load, the app ensures optimal use of available spectrum across the network, increasing total system capacity.
- **Improved User Experience:** Users in congested cells gain higher throughput via offloading, while cell-edge users experience more stable connections.
- **Reduced OPEX:** Automated optimization eliminates the need for manual parameter tuning and costly drive tests.
- **V2X & Slicing Support:** Capability to define policies for specific device types or slices allows operators to meet strict SLAs for critical services.
- **Architectural Flexibility:** Compliant with O-RAN standards, enabling deployment on Ericsson EIAP and interoperability with multi-vendor radio hardware.
- **Enhanced Stability:** Hierarchical control prevents conflicts between different RRM mechanisms, ensuring smooth network operation even under heavy load.
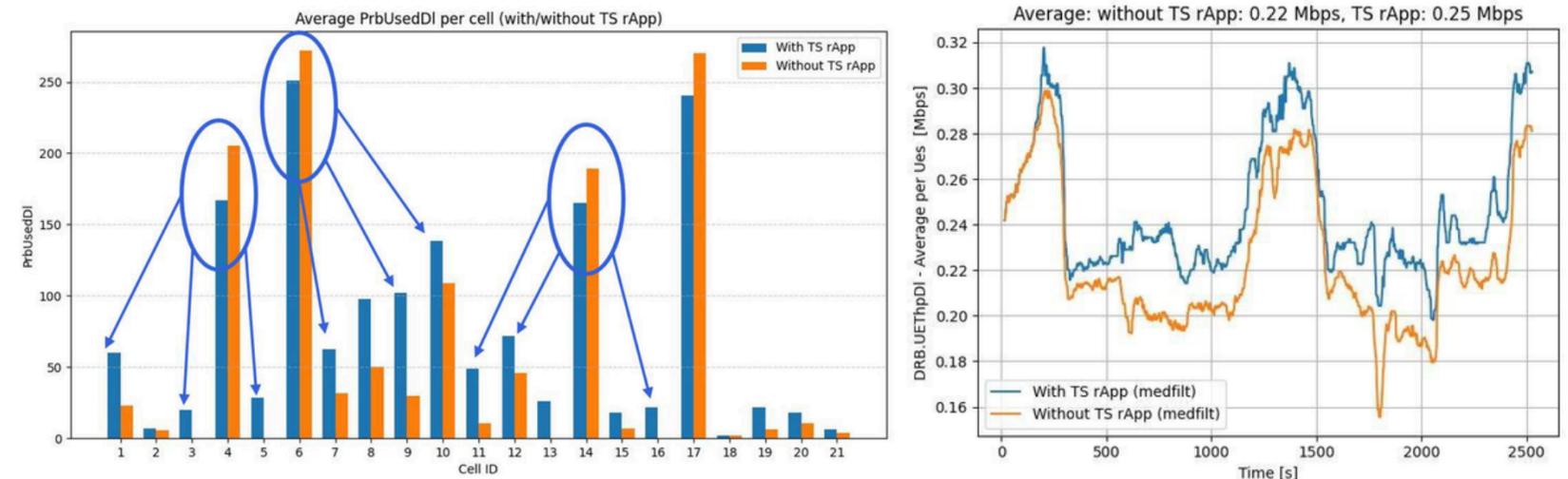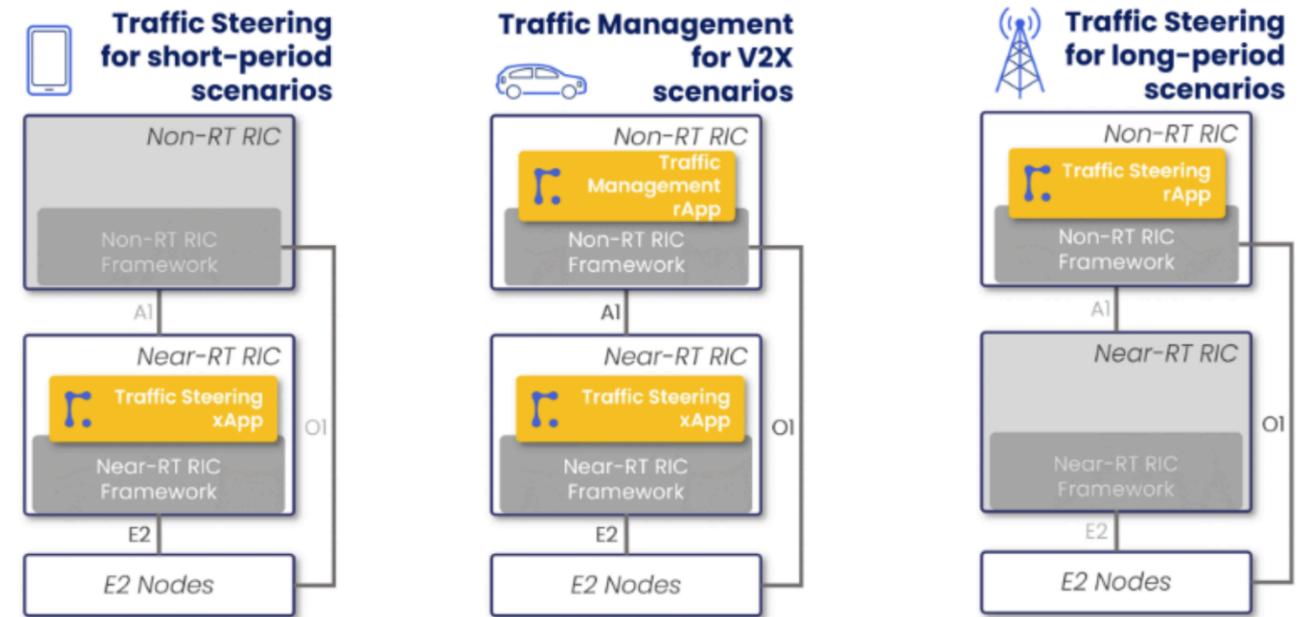
rApp characteristics

- **Supported technologies:** 4G, 5G, O-RAN
- **RAN technology:** O-RAN
- **RAN vendor:** multi-vendor
- **Interfaces:** O1 (CM/PM), A1 (Policy)
- **Deployment:** Non-RT RIC (SMO)
- **Algorithm:** AI/ML
- **Application:** Traffic Steering, Load Balancing

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