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Traffic Steering xApp Specifications

App description and Functional Guidelines

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Executive Summary
Net Reply's Traffic Steering xApp is an innovative solution designed to enhance 5G Radio Access Network (RAN) performance. This xApp optimizes network load distribution through advanced machine learning (ML) capabilities, improving resource utilization, minimizing congestion, and delivering seamless user experiences. Developed and validated in the BT Lab, leveraging VMware's dRIC platform and VIAVI's RIC Test environment, the xApp demonstrated robust integration, predictive adaptability, and operational effectiveness. Its successful validation paves the way for broader deployment in live networks, solidifying its role in next-generation telecommunications management.

App Description

The Traffic Steering xApp (TS xApp) is a modular application integrated into the near-real-time RAN Intelligent Controller (RIC) to address traffic imbalances in 5G networks. Operating via the E2 interface, it monitors real-time RAN metrics, predicts network conditions, and issues control commands to balance traffic across cells. By utilizing the VIAVI RIC Test environment and VMware dRIC, the TS xApp was tested in realistic, high-density urban scenarios. It supports diverse mobility patterns and service types, including eMBB, MIoT, and URLLC, making it versatile and robust for modern network demands.

Key Features

- Real-Time Traffic Steering:

  Monitors RAN key performance indicators (KPIs) to analyze cell utilization and predict load conditions.
  Implements traffic steering algorithms to distribute user equipment (UE) load dynamically.

- Machine Learning Integration:

  Predicts UE trajectories and channel conditions.
  Utilizes historical data for proactive optimization.

- Seamless RIC Integration:

  Communicates with VMware dRIC via E2SM-KPM and E2SM-RC models.
  Subscription-based event handling and efficient control signaling.

- Modular and Scalable Architecture:

  Deploys as a containerized application in Kubernetes environments.
  Ensures resilience and scalability, with flexible updates.

- Extensive Testing Validations:

  Validated under various network conditions, including anomalies and high-density urban scenarios.
  Proven performance improvements across multiple RAN services.

Technical Specifications

- **Platform Compatibility**: VMware dRIC 2.0.3
- **RIC Test Environment**: VIAVI RIC Test v2.0-30941-2cf029ef
- **E2AP Version**: 2.0
- **E2SM Models**:
  - **E2SM-KPM**: Key Performance Metrics monitoring.
  - **E2SM-RC**: Radio configuration management.
- **Deployment Environment**: Kubernetes in Docker (Kind)
  - **Pods**: Secured and isolated for enhanced testing fidelity.
- **Testing Setup**:
  - Simulated 62 cells across five frequency bands with an urban propagation model.
  - Supported up to 1,200 UEs with diverse mobility patterns (pedestrians, vehicles).
  - Services tested: eMBB, MIoT, URLLC, V2X, and district automation.
- **Key Functionalities**:
  - **E2 Subscription Requests**: Monitors specific network events.
  - **Indication Messages**: Provides real-time RAN updates.
  - **Control Commands**: Adjusts cell configurations to prevent congestion.

Conclusion

Net Reply's Traffic Steering xApp has proven its capability to enhance 5G RAN performance through intelligent traffic management and advanced ML-driven optimization. Thorough testing in VMware's dRIC and VIAVI RIC Test environments validated the xApp's ability to adapt to diverse network scenarios and maintain seamless interoperability within the O-RAN ecosystem.

The successful deployment and testing underscore the xApp's readiness for live network implementation. Moving forward, its integration with other intelligent applications will further amplify its potential, marking a significant step toward revolutionizing 5G network management. The TS xApp embodies the innovation and reliability required to meet the dynamic demands of next-generation telecommunications.

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