|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A black and white logo  Description automatically generated with low confidence | INTERNATIONAL TELECOMMUNICATION UNION  **TELECOMMUNICATION** **STANDARDIZATION SECTOR**  STUDY PERIOD 2022-2024 | | **Focus Group on AI Native Networks** | |
| **AINN-I-xx** | |
| **Original: English** | |
| **Question(s):** | | N/A | Virtual, TBD 2024 | |
| **INPUT DOCUMENT** | | | | |
| **Source:** | | *Cloud RAN* | | |
| **Title:** | | *Cloud RAN - Report on* *ITU WTSA Hackathon 2024 – The Smart Horizon* | | |
| **Contact:** | | Hubert Nare | | E-mail: [hubertnare27@gmail.com](mailto:hubertnare27@gmail.com) |

|  |  |
| --- | --- |
| **Abstract:** | This document contains the submission report for team name “Pragmatic\_Devs” towards ITU WTSA Hackathon 2024 for use case *“The Smart Horizon”.* |

## Use case introduction: “The Smart Horizon”

During my time as a student at Midlands State University (MSU), I noticed a recurring challenge—network bottlenecks during critical academic periods, particularly during exams. As the student population grew and the demand for consistent communication between campuses increased, the existing network infrastructure began to show its limitations. The problem became especially clear between MSU's Gweru and Harare campuses, which rely on public internet channels for inter-campus communication. Given that these campuses are geographically separated, the need for secure and reliable communication became even more apparent.

This hackathon use case, titled *Smart Horizon*, was developed to address these exact challenges. It focuses on creating an autonomous network system that leverages ORAN (Open Radio Access Networks), where MSU’s main campus IT department will manage a core network. The other campuses, such as Harare, will act as nodes or base stations within an ORAN setup, functioning as a wide-area network (WAN). By utilizing ORAN, the system takes advantage of multi-vendor support, providing flexibility in managing hardware and software components while ensuring interoperability.

One of the significant technical hurdles is managing limited bandwidth. The network architecture will operate within a static 1 GHz bandwidth, which imposes constraints but also presents opportunities for intelligent traffic management. The key innovation here is the use of xApps for intelligent network control, helping predict peak demand times, such as exam periods, and allocate resources accordingly. Furthermore, to secure communication over public internet channels, Virtual Router Redundancy Protocol (VRRP) will be deployed, ensuring that even if one connection fails, there’s a backup in place to maintain network integrity.

The backhaul between campuses will rely on optimized traffic management, ensuring that the limited bandwidth is used efficiently. By using ORAN, the system also enables better control over multivendor equipment, meaning MSU can incorporate various solutions while maintaining a unified, coherent network architecture.

The *Smart Horizon* initiative not only improves network performance but also aligns with future network standards like ITU-T Y.3172, which emphasizes machine learning integration in network management. By focusing on automation and self-optimization, the system will be able to make real-time adjustments based on traffic loads, effectively creating an adaptive, autonomous network environment. This approach aims to reduce human intervention, ensuring the network responds dynamically to challenges, and fosters long-term resilience.

The *Smart Horizon* initiative also supports the United Nations Sustainable Development Goals, particularly Goal 4 (Quality Education) and Goal 9 (Industry, Innovation, and Infrastructure). By enhancing MSU’s digital infrastructure, the project provides reliable access to educational resources, even during peak usage times, while fostering innovation through cutting-edge, sustainable network solutions.

* Phase 1:
* Phase 2:
* Phase 3:
* Phase 4:
* Phase 5:

**Clause-3: PS1: Pipeline Design**

**AI/ML Concept Used: Autonomous Network Management**  
 The pipeline design for the Smart Horizon:

* **SRC:** User Equipment (UE) locations across campuses
* **C:** Edge servers facilitating data processing and communication
* **M:** Algorithms for bandwidth allocation, peak load prediction, and dynamic routing based on ORAN principles
* **D:** Resource Allocation Application (rApp) for managing bandwidth and connectivity
* **Sink:** Intelligent Network Control Application (xApp) for real-time adjustments and optimizations

Clause-4: PS2: xApp design

Clause-5: Relation to Standards.

Clause-6: Code submission details

Clause-7: Self-Testing results

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_