International Journal of Core Engineering & Management
Volume-6, Issue-08, 2020 ISSN No: 2348-9510

TESTING COMMUNICATION NETWORK USING VARIOUS NETWORK TESTING FRAMEWORK- REACT, BRTU, TACC/TAP

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Abstract

Network devices such as DACS, Adtran, PE Routers, and Ethernet devices play a crucial role in modern communication infrastructures. Comprehensive testing of these devices is essential to ensure their reliable operation and optimal performance. This paper presents a comprehensive approach to testing network devices using a combination of REACT, BRTU, TACC/TAP, BRTU reset, and Enable Circuit techniques. Additionally, it details how to document and escalate issues to the Local Exchange Carrier (LEC) if tests are successful, but the problem persists. The paper discusses the high-level architecture, implementation details, and case studies demonstrating the effectiveness of this approach.

Keywords: Network Testing, REACT, BRTU, TACC/TAP, BRTU reset, Enable Circuit, DACS, Adtran, PE Routers, Ethernet devices, LEC

I. INTRODUCTION

The rapid and incessant evolution of network technologies has resulted in the proliferation of an ever-expanding array of highly sophisticated network devices, such as DACS, Adtran, PE Routers, and Ethernet devices. Ensuring the reliable and optimal performance of these critical network components is a matter of utmost importance, as they form the very foundation of modern communication infrastructures that have become indispensable to our daily lives, economic activities, and global connectivity.[1][2]

This paper provides an overview of these devices, explains the various testing methods, and guides the process of linking successful tests with trouble tickets for the Local Exchange Carrier (LEC), should problems persist after testing.

II. METHODOLOGY

This paper proposes a comprehensive approach to testing a diverse range of network devices. The framework strategically combines cutting-edge techniques, including REACT, BRTU, TACC/TAP, BRTU reset, and Enable Circuit, to provide a robust and flexible solution for ensuring the reliable operation and optimal performance of critical network components such as DACS, Adtran, PE Routers, and Ethernet devices.[4]

1. DACs (Digital Access Cross-connect Systems)

DACs enable the automatic connection of digital circuits, facilitating routing within a telecommunications network. Ensuring that these devices route signals correctly is essential to avoid outages.

Testing Steps for DACs:

International Journal of Core Engineering & Management
Volume-6, Issue-08, 2020 ISSN No: 2348-9510

- **BRTU Testing:** BRTU sends test signals through the network to evaluate the DAC's ability to correctly route digital signals. Metrics such as signal quality and path integrity are assessed.
- **TACC/TAP:** TACC/TAP is used to isolate and test specific circuits, allowing for more granular diagnosis of issues related to DAC routing.

2. Adtran Devices

Adtran devices provide various telecommunications solutions, primarily in routing and switching, which are crucial for ensuring connectivity across networks.

Testing Steps for Adtran Devices:

- **BRTU Testing:** Used to verify signal quality and circuit functionality, the BRTU helps in identifying routing issues in Adtran devices.
- **BRTU Reset:** A BRTU reset may be used to reinitialize the device to clear temporary faults.
- **TACC/TAP:** Adtran devices can also be tested through TACC/TAP to validate the data path and signal flow.

3. PE Routers

PE routers connect customer networks to the backbone of a telecommunications provider's MPLS (Multiprotocol Label Switching) network. Ensuring the proper configuration and operation of these routers is crucial for smooth data routing.

Testing Steps for PE Routers:

- **Circuit Testing and Enabling**: Circuit enabling tests verify that the circuits configured on PE routers are active and correctly forwarding traffic. If a circuit appears inactive, it must be enabled and retested.
- **BRTU Test and Reset:** BRTU is used to simulate network traffic, and any misconfigurations or hardware errors can be diagnosed. A reset can also be triggered in case of persistent faults.

4. Ethernet Devices

Ethernet switches and routers handle packet-based communication, a vital function in both local and wide area networks.[3],[4]

Testing Steps for Ethernet Devices:

- **BRTU Testing:** Ensures proper data flow through Ethernet interfaces by checking for errors such as packet loss, latency, and overall throughput.
- **TACC/TAP:** Circuit validation using TACC/TAP ensures that Ethernet devices are routing packets as expected without errors in the data path.

5. **REACT Testing**

REACT is an advanced testing framework designed for automated, remote testing of circuits and network devices. It enables proactive network monitoring and early issue identification, allowing network engineers to detect and resolve problems before they lead to service disruptions. REACT's powerful automated testing capabilities and remote diagnostic features make it a crucial tool for maintaining the reliability and performance of critical network infrastructure components.

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REACT Testing Procedure:

- **Automated Testing:** REACT allows for the automated execution of test scripts that check multiple network devices, circuits, and paths, including DACs, Adtran, and PE routers. This saves time and reduces human error.
- **Remote Diagnostics**: One of the key advantages of REACT is its remote diagnostic capability, allowing engineers to test circuits without needing to physically access the devices.
- **Real-Time Monitoring:** REACT provides real-time monitoring of device performance and alerting mechanisms, enabling early identification and resolution of issues.

By using REACT, network engineers can run tests efficiently and continuously, minimizing the time needed for manual intervention.

III. HIGH LEVEL ARCHITECTURE

The proposed framework integrates several techniques to establish a comprehensive network device testing approach. Key components of the framework include:

1. A REACT-based test suite for creating complex test scenarios, automated testing, and in-depth device behavior analysis.
2. BRTU for remote testing and diagnostics, enabling efficient troubleshooting without the need for on-site visits.
3. TACC/TAP for non-intrusive monitoring and analysis of network traffic, providing valuable insights into device performance.
4. BRTU reset and Enable Circuit functionalities for troubleshooting and restoring devices to their default state.
5. This framework is designed to be highly scalable and adaptable, allowing its application to a wide range of network devices, such as DACS, Adtran, PE Routers, and Ethernet devices
6. The framework also incorporates a robust ticketing system that links the testing process to the LEC in the event that the issue persists, even after successful testing.

The Figure 1 below depicts testing of various network devices and Circuits using the network testing techniques mentioned above.

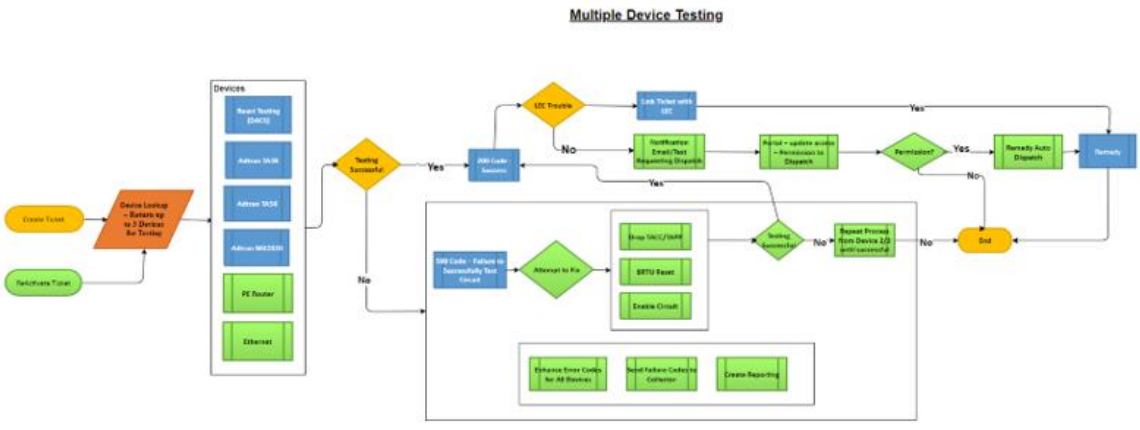

Figure 1

IV. CONCLUSION

This paper presents a comprehensive approach to testing a diverse range of network devices. The proposed framework strategically combines cutting-edge techniques, including REACT, BRTU, TACC/TAP, BRTU reset, and Enable Circuit, to provide a robust and flexible solution for ensuring the reliable operation and optimal performance of critical network components such as DACS, Adtran, PE Routers, and Ethernet devices. By leveraging the strengths of each technique, the framework enables thorough testing, efficient troubleshooting, and in-depth analysis of network device behavior, ultimately contributing to the overall reliability and effectiveness of modern communication infrastructures.

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