

Framework for Implementing Lossless Techniques in Wide Area Networks

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Abstract

- This document proposes a comprehensive framework to address the challenges of **efficient, reliable, and cost-effective** large volume data transmission over Wide Area Networks (WANs). The framework focuses on **planning and managing traffic paths, network slicing, and utilizing multi-level network buffers.**

Introduction

- In the IETF 119, we highlighted several critical large data transmission use cases that emphasize the **necessity of low packet loss and high throughput** in WANs, such as scientific research, financial transactions, and multimedia content delivery.

Introduction

The characteristics and requirements of large data transmission are listed as follows:

- Large Volume
 - Enterprises must balance the need for high-capacity data transmission with cost considerations.
- Timeliness
 - Timeliness needs high-capacity data transmission.
- Predictability
 - Predictability helps in optimizing resource allocation, minimizing congestion, and enhancing overall network performance.

Network Challenges Posed by Large Volume Data Transmission

Due to the characteristics and requirements of large volume data transmission, the challenges posed as follow:

- Limited Network Capacity
 - traffic conflicts resulting in queuing and jitter
- Congestion Hotspots
 - retransmission leads to latency and reduce the network's throughput
- Inefficient Buffer Utilization
 - local device's buffer can't meet bursty traffic

Technique Framework

Facing the challenges, we propose the solution as follow:

1) Adaptive Planning and Management of Network Resource

We can **allocate network resource** based on sharing network information.

Specific Requirments:

- Network Resource Reporting and User Request
- Network Resource Allocation and Policy Distribution
- Network State Measurement and Telemetry

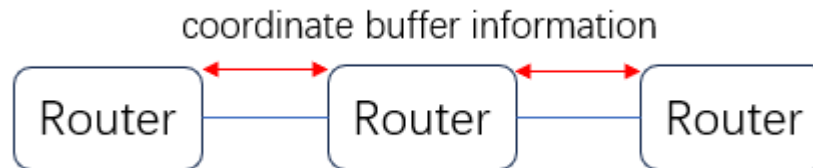
Technique Framework

2) Use and Management of Multi-Level Network Buffers

We can use advanced congestion management strategies which are necessary to **coordinate buffer information** among the device across the network.

Specific Requirments:

- Single Device Buffer Sharing and Management
- Cross-Device Buffer Coordination
- Network State Measurement and Telemetry



Technique Framework

Requesting Source Rate Control

- Network devices can **send rate control requests to the source** via data packet marking or separate control packets.
- This method is useful during widespread network congestion, leveraging **source rate reduction** to manage traffic while the network device can't solve the congestion problem itself.



Conclusion

The proposed framework addresses the challenges of large volume data transmission over WANs by enhancing **traffic management and resource allocation strategies** and **efficient buffer management**, the framework ensures efficient, reliable, and cost-effective data transmission. This approach meets the demands of data-intensive applications, providing a robust solution for large volume data transmission in WAN environments.