DOI https://doi.org/10.30525/978-9934-26-459-7-3

SPECIAL FEATURES OF IMPLEMENTING QOS IN NETWORK-BASED AUDIO ANALYTICS SYSTEMS

Anton Poroshenko[1*], Andriy Kovalenko[1]
[1]Kharkiv National University of Radio Electronics, Kharkiv, Ukraine
**Corresponding author's e-mail: anton.poroshenko@nure.ua*
Received 2 April 2024, www.isma.lv

Abstract

This article examines the complexities of implementing Quality of Service (QoS) within network-based audio analytics systems, which are integral for the collection, transmission, processing, and analysis of audio data across network environments. By exploring the typical architecture and stages of QoS providing, special features of implementing QoS in network-based audio analytics systems are considered. Notably, the need to establish robust queue management mechanisms and optimize queue size and parameters is emphasized to ensure the required level of QoS. Addressing these challenges enables the optimization of network-based audio analytics systems' effectiveness and reliability across various applications and industries.

Key words: *quality of service, audio analytics systems, traffic classification, traffic policing.*

1. Introduction

Network-based audio analytics systems represent sophisticated solutions that leverage network technologies for the comprehensive collection, transmission, processing, and analysis of audio data. With applications ranging from audio surveillance to sound signal analysis and voice analytics, these systems play a crucial role in various domains.

Quality of Service (QoS) stands as a cornerstone mechanism within computer networks, ensuring the management and guarantee of data transmission services' quality. The overarching aim of QoS is to maintain a specific level of reliability, throughput, delay, and other network parameters, tailored to meet the demands of specific applications or services. However, implementing QoS within network-based audio analytics systems presents unique challenges, primarily revolving around ensuring the stability of audio

data transmission and minimizing delays to facilitate quality audio information analysis.

Successful implementation of QoS within network-based audio analytics systems demands a good understanding of their architecture and operational requirements. By addressing these challenges and tailoring QoS mechanisms to suit the specific needs of audio data transmission, network-based audio analytics systems can achieve optimal performance and reliability across diverse applications and industries.

2. QoS in network-based audio analytics systems

Network-based audio analytics systems are comprehensive software or hardware-software solutions that utilize network technologies for the collection, transmission, processing, and analysis of audio data [1]. These systems are employed for various purposes, including audio surveillance, sound signal analysis, voice analytics, and others. The typical architecture of a network audio analytics system is illustrated in Figure 1.

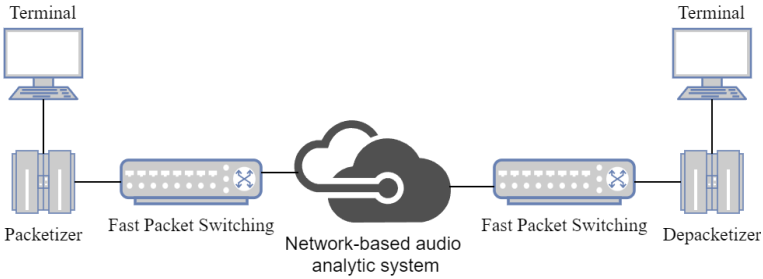

Figure 1. Architecture of a network-based audio analytics system

Quality of Service serves as a mechanism used in computer networks to manage and guarantee the quality of data transmission services [2]. The primary goal of QoS is to ensure a certain level of reliability, throughput, delay, and other network parameters to support the requirements of specific applications or services. Implementing QoS in network-based audio analytics systems has its peculiarities, as it is crucial to ensure the stability of audio data transmission and reduce delays to ensure quality audio information analysis.

Typically, the main stages of ensuring QoS include traffic classification and marking, traffic policing, and the application of queuing and traffic shaping mechanisms. Through classification and marking, traffic is categ-

rized into classes to determine processing priority. Traffic policing is used to limit or regulate the amount of data transmission through the network interface to a certain level, according to pre-established rules and parameters. In cases where traffic requires limitation or prioritization, packets may be queued according to their QoS class. Traffic shaping involves regulating the level of outbound traffic to reduce congestion or harmonize traffic volume.

These QoS implementation mechanisms may not always be suitable for modern network-based audio analytics systems due to their more complex architecture [3]. In the context of network-based audio analytics systems, it is important to consider the specifics of data packetization and depacketization, as well as potential encryption, which may affect queue management mechanisms and QoS provisioning. Since all secured traffic passes through a packetizer, it is crucial to establish queue management mechanisms both at the output and input of this device. This allows for managing data flows before packetization and after depacketization, ensuring the required level of QoS.

Queue size and queue management parameters should be established considering the bandwidth requirements of the packetizer and cryptographic algorithms (if present). This may involve determining the maximum allowable delay and queue volume for each type of traffic. Using multiple queues with different priority levels enables processing high-priority traffic with minimal delay while still providing access to resources for less critical traffic types. However, it is necessary to avoid situations where less important traffic is blocked in the queue and does not receive sufficient resources due to the intense flow of more prioritized data.

3. Conclusions

Achieving effective QoS in network-based audio analytics systems requires a comprehensive understanding of their architecture and operational intricacies. By addressing these challenges, it is possible to enhance the performance and reliability of such systems across various applications and industries, ultimately advancing the state-of-the-art in audio data analysis and network-based technologies

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Authors

Anton Poroshenko, 06.10.1998, Luhansk, Ukraine

Current position, grades: PhD student
University studies: computer networks
Scientific interest: audio analytics, computer networks
Publications (number or main): 13
Experience: assistant in Kharkiv National University of Radio Electronics (2021 – present)

Andriy Kovalenko, 30.04.1980, Kharkiv, Ukraine

Current position, grades: Department Head
University studies: computer networks
Scientific interest: safety and security of critical Instrumentation and Control systems of power networks, computer networking, defence-in-depth and diversity, reliability, risk analysis
Publications (number or main): 280
Experience: Assistant Professor, Department of Electronic Computers, Computer Engineering and Control Faculty, Kharkiv National University of Radio Electronics (2008). Associate Professor, Department of Electronic Computers, Computer Engineering and Control Faculty, Kharkiv National University of Radio Electronics (2010). Professor, Department of Electronic Computers, Computer Engineering and Control Faculty, Kharkiv National University of Radio Electronics (2019 – present). Senior Researcher (part-time), Research and Production Corporation Radiy (2009 – present).