

عنوان مقاله:

Validation of Critical Data and Voice Hybrid Scheduler (CDVHS) for Cyber-Physical Computer Systems (CPCS) in
Constrained-Bandwidth VoIP Networks

محل انتشار:

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خلاصه مقاله:

Consequent upon advances in networking technology is the emergence of converged networks, enabling a new generation of integrated data and voice application. Voice over Internet Protocol (VoIP) networks are converged multiservice systems in which various class types (CTs) broadly classified as real time and non-real time, share the converged transmission and management infrastructure as well as other resources of the network. Real-time traffics are delay-sensitive. Cyber-physical computer systems (CPCS) are new generation of systems which find application in industrial/process control and automation systems. Information generated by CPCS is generally classified as critical data and are therefore delay-sensitive. The volume of data generated by these emerging systems will continue to increase the load on the converged network. This work therefore proposes an optimized hybrid scheduling architecture that evaluates, polices, classifies and maps incoming IP flows into different class types. Using packet loss probability and end-to-end packet delay quality of service metrics, the work evaluates the performance when high volumes of business/mission-critical data (B/MCD) and voice traffics are transmitted in constrained-bandwidth VoIP networks. Critical data is captured, separated from best-effort data and given due precedence/priority. A structured algorithm defining the different levels of abstraction was developed and described. Riverbed Modeler, version 17.5 was used to validate and simulate the performance of the hybrid scheduler. Comparison with those of Class-Based Weighted Fair Queue (CBWFQ), Application-Aware Scheduler (App-AS), Low Latency Queuing (LLQ), Contention-Aware Temporary Fair Scheduling (CATFS) and Low Latency and Efficient Packet Scheduling (LLEPS) algorithms respectively gave packet loss evaluation of 0.83%, 22.71%, 26.50%, 18.93%, 24.22% and 6.81%. Delay evaluation respectively gave 3.13%, 21.09%, 22.65%, 21.88%, 10.94%, and 20.31%. These results show that the hybrid architecture achieves better packet-loss probability and latency than similar existing schedulers. Comparison of the impact of different coding schemes on the performance of the proposed model respectively gave packet loss evaluation of 60%, 33.33% and 6.67% for G.711, G.726 and G.729. Delay evaluation respectively gave 34.19%, 33.86% and 31.94%. These results show that the G.729 coding scheme offers lower packet loss and better end-to-end delay at 8kbps bit rate and therefore guarantees better network QoS performance.

کلمات کلیدی:

Critical data, hybrid scheduler, cyber-physical computer systems, quality of service, structured algorithm, constrained bandwidth.

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