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Poster

Towards Predictable and Intelligent Real-time IoT Applications

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CISTER-TR-180409

2018/04/10

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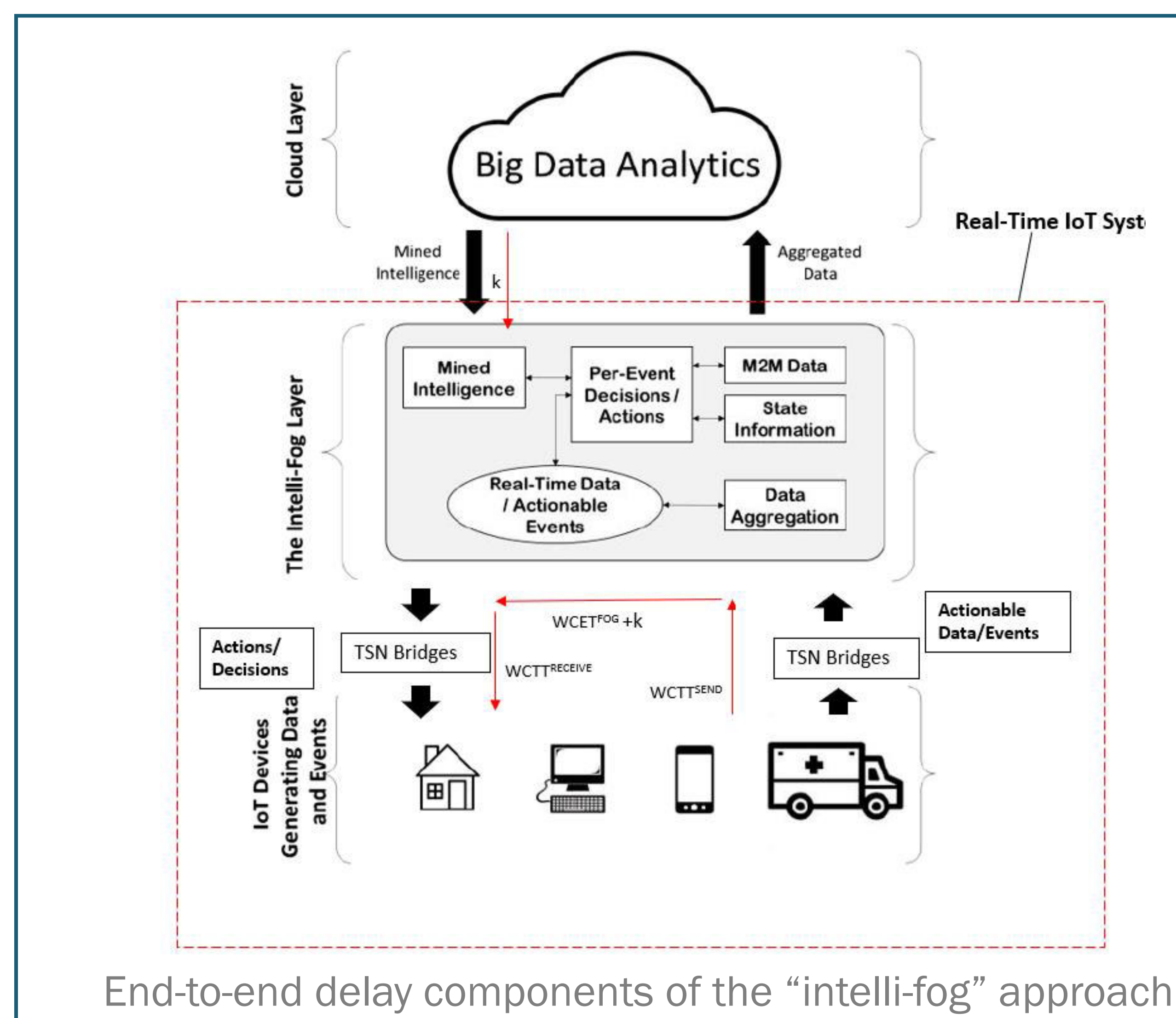
<http://www.cister.isep.ipp.pt>

Abstract

Towards Predictable and Intelligent Real-time IoT Applications

Motivation

- Predictable timing property is fundamental to Real-Time applications.
- Real-Time IoT applications requires both predictable and intelligent responses to actionable events
- A previous work proposed fog computing for intelligent IoT applications but does not examine timing properties of the approach.



Fog Computing and TSN

- Time-Sensitive Networking (TSN) provides standards for achieving not just a reliable but also a bounded-delay transmission.
- Fog computing - a decentralized, location aware computing paradigm - has been adopted in different applications to improve the responsiveness of IoT and more and more applications tend to follow this paradigm in the future.
- Leveraging the Time Sensitive Networking (TSN) analysis models, combined with imprecise computation and deadline models, we seek to develop an approach to analyze and provide predictable delays in intelligent response to actionable events in IoT applications.

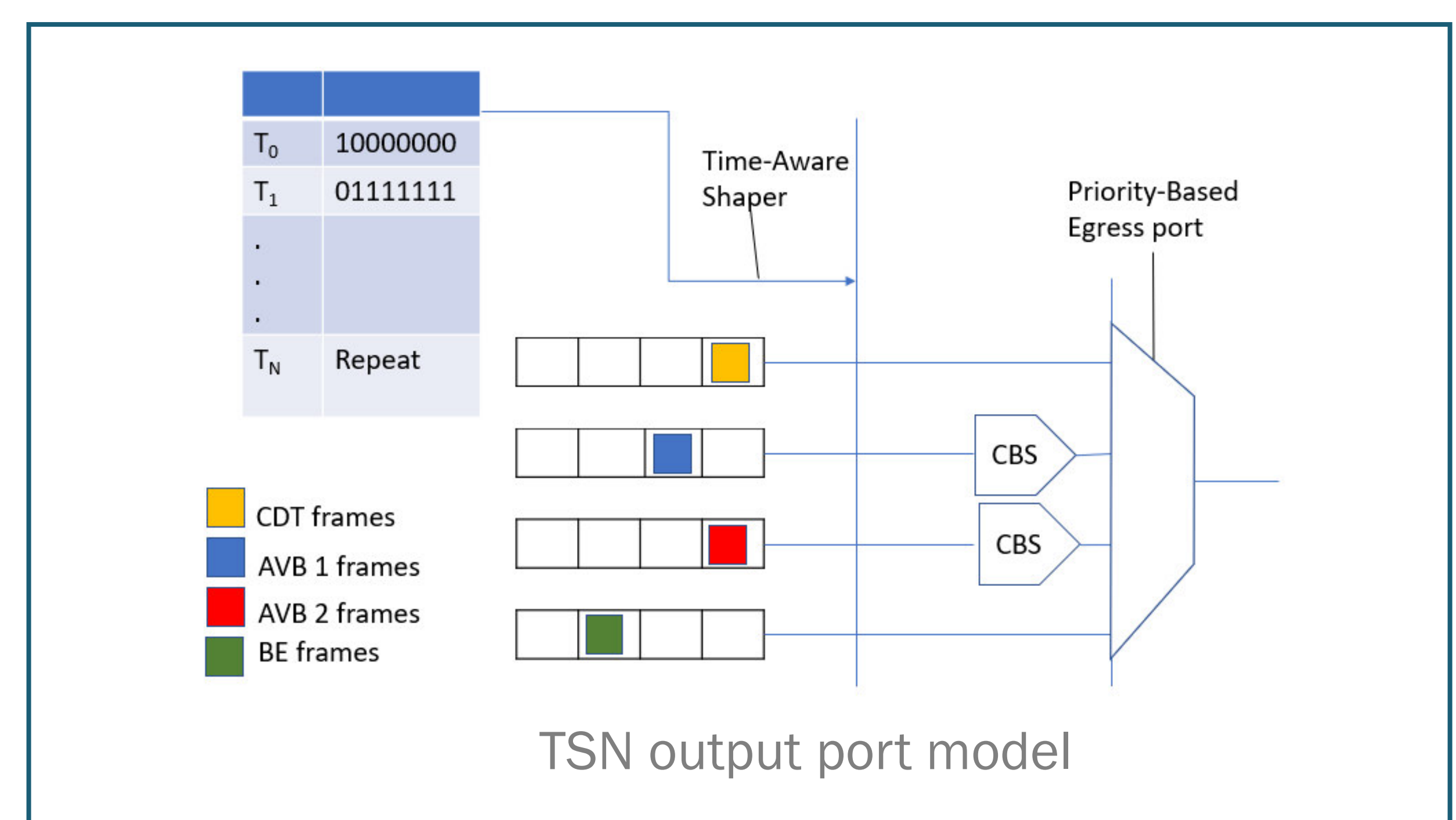
References

- [1] E. Okorafor, and M. A. Ojewale, "An "Intelli-Fog" Approach to Managing Real Time Actionable Data in IoT Applications", in Proceedings of the 4th International Conference on Advances in Big Data Analytics, Las Vegas, July 2017.
- [2] Finn N., Time-sensitive and Deterministic Networking Whitepaper, Huawei Technologies, July, 2017.

Methodology

$$R \leq 2WCTT + c$$

- Leverage TSN analysis models to bound WCTT between devices and the fog layer
- Achieve predictable synchronization delay using the imprecise computation model with bounded buffers
- Compositional-Performance Analysis



Contributions and Future works

- Reduced to the response time analysis to a TSN scheduling problem
- Proposed an imprecise computation model to achieve predictable synchronization with cloud platforms for IoT
- We intend present formal analysis of each component of the end-to-end delay to achieve complete predictability
- We also intend to experimentally evaluate the presented analysis to validate the approach

