



Ciclo de Seminários

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The Future Quantum Internet: Research Challenges

Quantum information processing is at the cusp of having significant impacts on technology and society in the form of providing unbreakable security, ultra-high-precision distributed sensing with applications to metrology and science discovery (e.g., LIGO), much higher-rate deep space optical communications than possible with conventional systems, and polynomial speeds up on graphical search with implications to big data. Most of these applications are enabled by high-rate distributed shared entanglement between pairs and groups of users. A critical missing component that prevents crossing this threshold is a distributed infrastructure in the form of a world-wide "Quantum Internet" to enable this. This motivates our study of quantum networks, namely what the right architecture is and how to operate it, i.e., route multiple quantum information flows, and allocate resources fairly and dynamically.

In this talk we review a specific entanglement-based quantum network architecture and present opportunities and challenges related to resource sharing among multiple parties of users. In particular, we focus on issues related to resource allocation based on global/local state information and the benefits of path diversity. Last, we evaluate the performance of an entanglement-based quantum switch.

Don Towsley holds a B.A. in Physics (1971) and a Ph.D. in Computer Science (1975) from University of Texas. He is currently a Distinguished Professor at the University of Massachusetts in the College of Information & Computer Sciences. He has held visiting positions at numerous universities and research labs. His research interests include network science, performance evaluation, and quantum networking. He is a corresponding member of the Brazilian Academy of Sciences and has received several achievement awards including the 2007 IEEE Koji Kobayashi Award and the 2011 INFOCOM Achievement Award. He has received numerous Test of Time Awards. He also received the 1998 IEEE Communications Society William Bennett Best Paper Award. Last, he has been elected Fellow of both the ACM and IEEE.

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