Advancing M2M communications management: A cloud-based system for cellular traffic analysis

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Abstract - Advances in micro-electro-mechanical systems (MEMS), computing hardware, and software algorithms for wireless sensor networks (WSNs) have boosted the adoption of WSNs, also known as machine-to-machine (M2M) communications systems, in many fields including vehicle tracking, supply chain management, security, and healthcare. Due to the large-scale deployments of many commercial applications and the diversity of hardware and software, the management of these M2M communications systems is becoming more and more cumbersome. Motivated by the challenges posed by a real-life commercial M2M communications system featuring millions of heterogeneous devices connected to hundreds of applications using a GSM cellular network, we developed a cloud-based solution for cellular traffic analysis aimed at M2M communications systems. The proposed system captures and stores traffic generated by the M2M communications system 24/7, and can process and analyze one day worth of traffic in 2.5 hours for $2-3 using cloud computing. We also report on case studies, where the proposed solution was employed to detect misbehaving devices and test different configuration for select devices.

Brief Bio - Dr. Giacomo Ghidini is a Senior Applied Research Engineer at Numerex Corp., a leading provider of M2M communications systems, where is the technical lead of the Big Data Initiative aimed at extracting actionable information from the data generated by millions of wireless sensors deployed in hundreds of diverse commercial applications from oil and gas to vehicle tracking and security all over North America. Giacomo earned his Ph.D. degree from the University of Texas at Arlington, and M.S. and B.S. degrees from the University of Bologna, Italy.