The *scientific objectives* of the CROWN project are as follows:

- Radically rethink the foundations of wireless network control and management; understand the fundamental issues and tradeoffs in control wireless networks through self-organization and implementing locally coordinated mechanisms to reach macroscopic operating network regimes.
- Create novel, flexible methods for achieving self-awareness through learning and providing dynamic network feedback amidst network uncertainties.
- Develop coordinated optimization methods based on iterative techniques for primary network operations such as connectivity maximization, source identification and localization.
- Provide a concrete methodology for the validation and qualitative performance assessment of our techniques in achieving solid network performance objectives like maximum throughput, minimum delay and minimum energy consumption; use delay- and disruption-tolerant wireless networks as a use case paradigm that is expected to be dominant in future networks.

In more detail, the *techical objectives* we intend to fulfill in CROWN are as follows:

- Develop a systematic methodology for understanding fundamental performance limits in building and exploiting self-awareness in wireless network management beyond layer boundaries.
- Understand and optimize fundamental tradeoffs pertaining to the creation and evolution of self-awareness, and most notably the crucial accuracy-energy-latency-overhead tradeoff which has direct ramifications to efficient wireless network management.
- Design disruptive methods for developing self-awareness through extraction of knowledge from the wireless networked system with statistical learning and dynamic and selective network feedback collection and processing.
- Fortify autonomic network operation by efficiently coping with resource conflicts, selfishness and competition and guide the network to the optimal operating point in terms of derived utility and energy consumption.
- Understand the governing laws that connect microscopic control and simple local interactions with macroscopic phase transition and threshold phenomena in network operation.
- Harvest the potential of coordinated belief propagation methods inspired by statistical mechanics to optimize network connectivity and to resolve long-standing challenges such as source detection and localization that are at the core of future autonomic wireless networks.
- Develop decentralized coordinated optimization approaches towards achieving network performance objectives, where coordination is achieved through intelligent signals passed

through the network.

- Leverage the delay-tolerant wireless network paradigm as a case study platform to apply our uncoordinated and coordinated network control methods and to address and optimize fundamental performance tradeoffs.