Title: Cognitive Networking Techniques on content distribution networks

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Description

The goal of this research work is to apply cognitive networking techniques to the optimization and management of content distribution networks using the Bittorrent protocol.

This work is inspired in the visionary paper of Clark entitled "A knowledge plane for the Internet". Clark envisions a sort of network that self-adjusts and that can automatically discover when something goes wrong. To that end, he proposes a pervasive entity called the Knowledge plane providing services and advice to other elements of the network.

Clark defined cognitive networking as a ``representation, learning and reasoning that allow the knowledge plane to be aware of the network and its actions in the network'', always aiming at network-wide optimization and end-to-end network-wide goals. Similarly to autonomic computing, cognitive networking basic functions are observation, analysis, decision making and action.

Cognitive networking can be considered one step further from autonomic networking. It is an evolution of autonomic computing which provides the network with the ability to think, learn and remember. Cognitive networks may adapt in response to conditions or events based on reasoning and previously acquired knowledge. In other words, a cognitive network can dynamically modify its topology or operational parameters to respond to user needs and, at the same time, use policies which allow optimizing the overall network performance.

The working plan is the following:

1. Introduction to the problem: study of the basic bibliography on cognitive networking and optimization of bittorrent networks.

2. Study and modification of a real BitTorrent implementation. Modify the tool (BT) to capture sensor information such as swarm members, locality, latency, and availability.

4. Extract knowledge from the sensors thanks to cognitive techniques. The system will learn from past events aiming to optimize its current conditions. Propose new cooperative techniques to optimize content distribution and storage.

5. Analysis and evaluation of the cooperative techniques in a real Internet testbed (PlanetLab network).

References

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