SoftOffload – A Programmable Approach for Mobile Offloading

Background and Motivations
• Rapid increase of mobile data traffic overloads the cellular networks
• Massive deployment of 4G and WiFi in metropolitan areas
• Hardware advance on smartphones, e.g. wireless connectivity
• Collaboratively utilize resources on devices and networks
• Improve performance and energy efficiency for networks and users

Earlier Design

Challenging Issues
• Paper driven work – adhoc design for limited scenarios
• Deployability – customized protocols and components
• Extensibility – lack of open API, platform, modular design
• Scalability – user growth, variance of hardware, operators policy
• Performance – limited adaptation for wireless and core dynamics
• Openness – lack of community interests or supports

SoftOffload Architecture

Key Components
• SoftOffload controller – Floodlight based, with SoftOffload extension
• Local agent – Click based, with offloading module
• SDN switches – OpenvSwitch, supporting OpenFlow
• Smartphone extensions – support collaborative offloading
• Communications – OpenFlow, SoftOffload protocol

Use Cases and Research Initiatives
• Cellular WiFi inter offloading – load balancing, energy efficiency
• WiFi intra offloading – meeting, exhibition alike scenarios
• Monitor wireless and backhaul access – support offloading decision
• SDN supported mobility management
• Enhance security in wireless mobile networks [2]

On-going Work
• Modularize monitoring, mobility management, security enhancement
• Investigate a balanced design: centralized, distributed
• Explore channel management and the impact
• Manage uplink and downlink for real time and TCP-based traffic
• Test and evaluate the system in a live environment
• Release open-source packages to the community

Reference

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