

Mobile Device Offloading Using Enterprise Network and Cloud Resources

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We seek to design a mobile application offloading framework for enterprise settings that *maintains security*, supports *multiple objectives*, performs completely *automated application partitioning*, and opportunistically *leverages any available computing resources*.

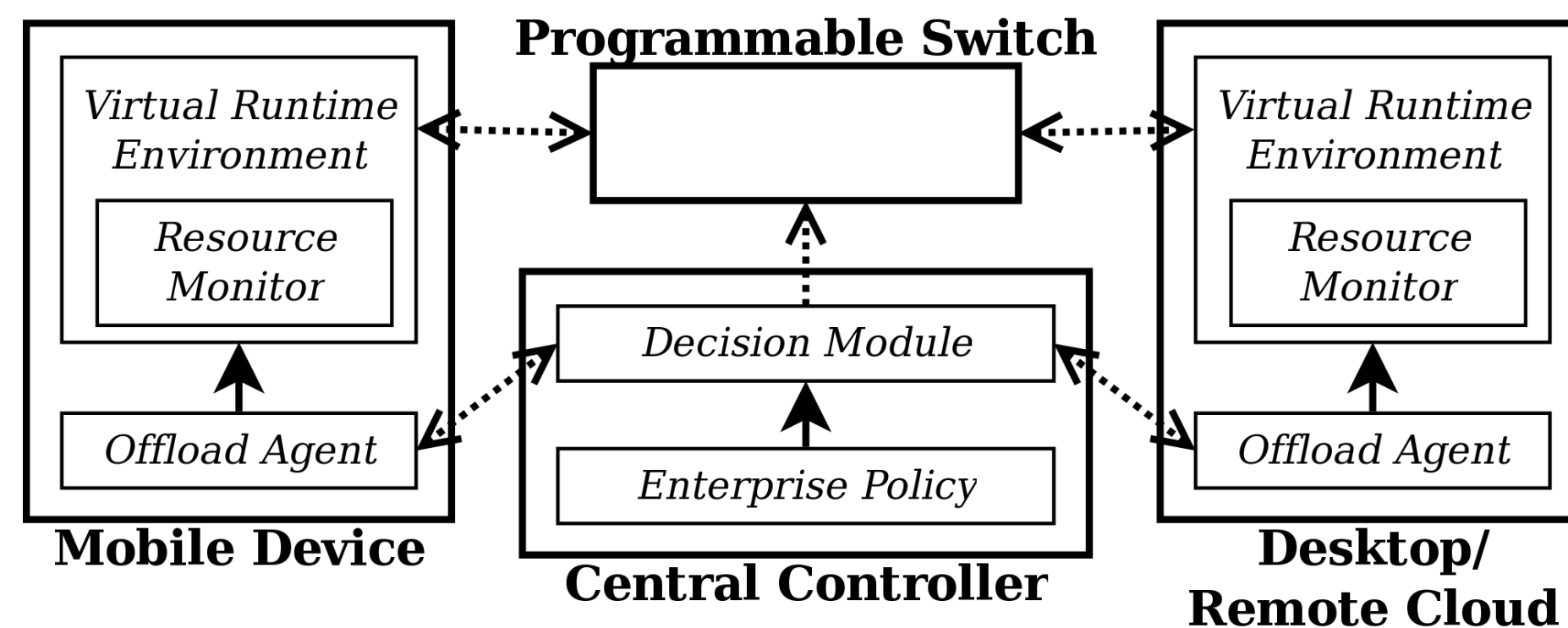


Focus on enterprise networks containing:

- 1) Mobile devices running one or more resource-demanding applications
- 2) Desktops which are occasionally idle
- 3) Access to a remote cloud
- 4) Central controller for programmable network fabric and offloading system

SYSTEM ARCHITECTURE

Offload Agent:
facilitates decision module/runtime environment communication



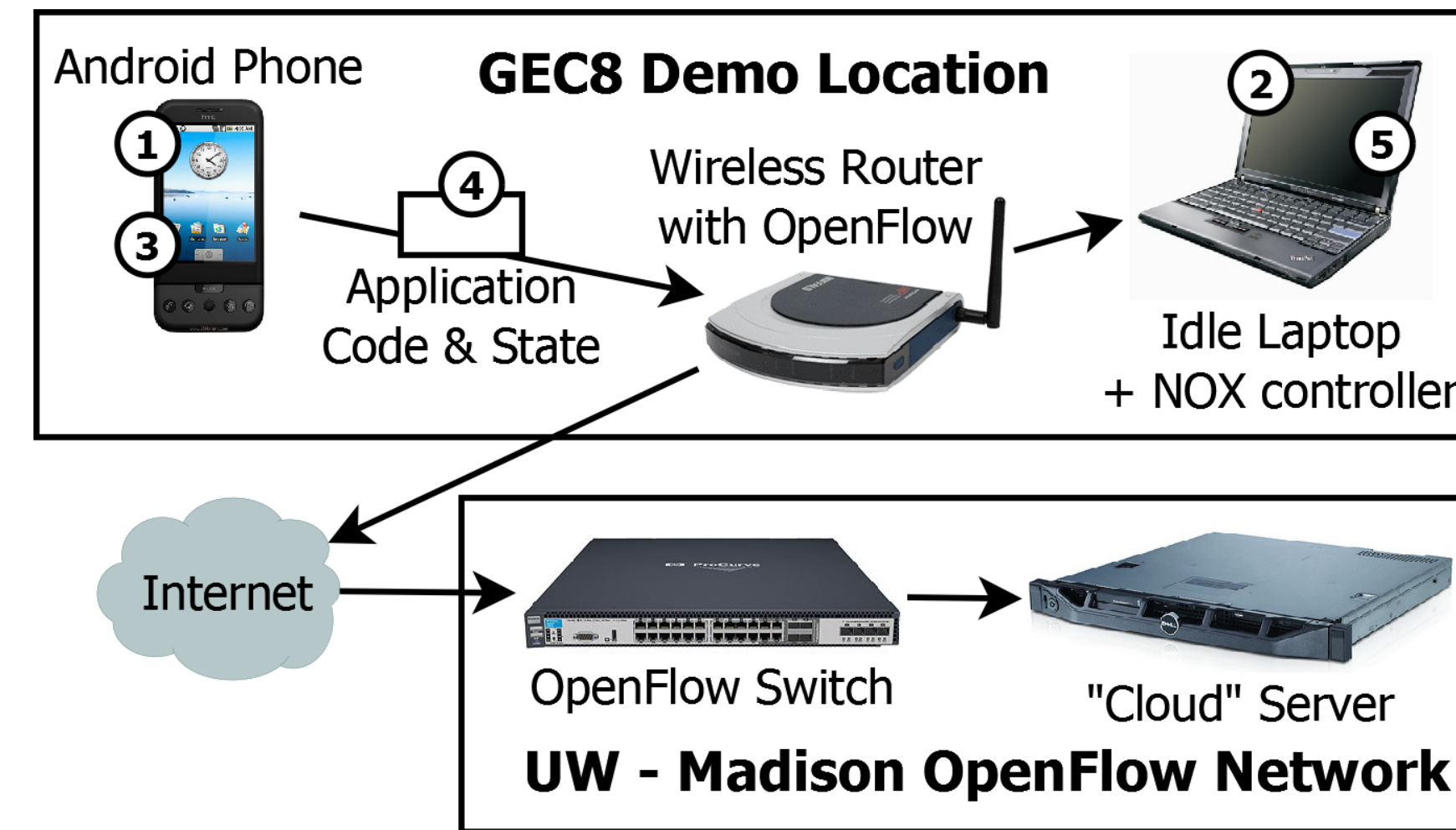
Virtual Runtime Environment:

monitors application resource usage at fine granularity; captures and restores execution state of offloaded applications

Enterprise Policy: administrator specified security levels and objectives (energy use, execution time, etc.) for devices and apps

Decision Module: makes all decisions on what and where to offload based on enterprise policy and resource usage information

DEMONSTRATION



Local Offloading

- 1) Launch compute intensive application on *Android Phone*
- 2) Specify offloading destination and tell NOX controller
- 3) Stop application on *Phone* and capture execution state
- 4) Transfer execution state to *Idle Laptop*
- 5) Launch new runtime environment and resume execution

Remote Cloud Offloading

Similar to *local offloading*, except execution state and application code are transferred across the Internet to a "cloud" server on the UW-Madison OpenFlow network.

OFFLOADING DECISION PROCESS

- 1) Monitor resource usage for each application at a fine granularity
- 2) Construct a list of candidate computing resources where the trust level exceeds the required security of an application and device
- 3) Select an application to offload and a destination to optimize administrator-specified objectives across all mobile devices
- 4) Move applications between offloading destinations as conditions change — applications are launched, devices join the network, etc.