Handheld users are running increasingly complex mobile applications with (1) high processing and energy demands, e.g., speech recognition, and (2) operations on sensitive data, e.g., health records. Application-independent offloading is a widely proposed solution to address handheld performance and energy demands without re-writing applications: MAUI [Cuervo ’10], CloneCloud [Chun ’11], Amazon Silk, etc. Offloading frameworks divide a mobile applications’ execution between a handheld device and a compute resource.

We posit there are several key roadblocks limiting the adoption of existing offloading frameworks:

- **Privacy and trust**: sensitive data in application state can be leaked in transit or on compute resources
- **Resource availability**: applications may be offloaded to a diverse set of compute resources with varying availability and processing capabilities
- **Scalability**: many handhelds with different goals (energy savings, latency improvements) must be able to simultaneously offload

**ECOS Prototype**

Enterprise Centric Offloading System (ECOS) is our in-progress prototype that addresses the roadblocks inhibiting the adoption of offloading. In practice, ECOS can be used in its entirety, or the security and resource assignment principles we employ can be used to augment any of the existing offloading proposals (CloneCloud, MAUI, etc.).

Our ECOS prototype currently has the following features:

- Modified Android runtime environment capable of capturing, transferring, differencing, and restoring execution state
- Handheld offload agent responsible for “trapping” at offload points, requesting resources, and initiating offloads
- Resource offload agent responsible for reporting processing capabilities and managing offload runtime environments
- Logically central controller which allocates resources and populates switch flow tables based on policy-specified trust relationships, resource availability, and handheld users goals

**Experimental in GENI**

We leverage GENI to (1) diversify our compute resource base and (2) identify key factors and mechanisms to include in our resource assignment algorithm. Android emulators running at Wisconsin serve as handheld devices, while Linux boxes at Wisconsin and ProtoGENI nodes at GPO serve as compute resources. All communication occurs over OpenFlow switches at Wisconsin, NLR, and GPO.

Our results have already identified the importance of:

- Assigning offloads with different goals to different resources
- Preferring the same compute resource for subsequent offloads to reduce state transfer overhead

**We are currently using experiments in GENI to understand**:

- How significantly throughput impacts offload overhead?
- Whether we can learn, based on execution times on compute resources, which offloads provided no benefits and adapt our offload and resource assignment decisions?