Background

• SOA, implemented as Web services, is a key enabler for NEC

• The ability to find services dynamically is a requirement
  – but challenging in dynamic settings

• At the same time, we need flexibility
  – clients must be able to access information in a manner that is suited to their needs and abilities
Background

• To achieve this we need:
  – a service discovery mechanism
  – support for automatic service selection and orchestration
  – support for QoS

• Combining all these needs raises a number of issues:
  – Semantic Web Services give flexibility, but are verbose
  – Tactical military networks have limited capabilities
Service Registries

Communication between client, registry and service:

1. Look-up/Search
2. Response
3. Contacting the service
Service Registries

The liveness problem

The availability problem
Non-registry solutions

• Fully decentralized mechanism:
  – Robustness: Resilience to partial failure of the network.
  – Liveness: An up to date view of available services.

• Decentralized solutions are “chatty”:
  – Need to optimize data rate requirements!
    • Compression etc.
SAM

- Service Advertisements in MANETs (SAM)
  - Advertisements of available Web services
  - Support for additional metadata
  - Bandwidth efficient:
    - only transmits information that changes over time
    - static information is assumed to be pre-distributed
SAM Service Advertisements

Advertisements contain the following data:

- Position information (optional)
- A list of services containing:
  - Service ID (required)
    A hash over the static parts of a WSDL
  - Endpoint URL (required)
    The dynamic part of the WSDL, i.e. service endpoint
  - Metadata (optional)
    Semantic data, etc.
Service Selection Challenges

• Operations vary in complexity
  – the number of units and their capabilities are difficult to predict.

• Different clients will use the same service in different ways
  – to define these differences we use QoS as a selection parameter
QoS in Mobile Services

• We divide QoS for mobile service in:
  – Static QoS
    • parameters that do not change
    • e.g. max resolution of an image
  – Dynamic QoS
    • parameters that can change
    • e.g. position of camera (mounted on a UAV)

• This requires an extended service description
Semantic Web Services in MANETs

• Web Services give:
  – manual selection of service type
  – best case: dynamically finds instances of known types

• Semantic Web Services give:
  – dynamically discover both service types and instances
  – dynamic orchestration
  – automated selection of instances

• OWL-S is a service ontology defined using OWL
  – We use a subset of OWL-S with an extended QoS description
Experimental Implementation

Get image

Plain WS lookup

Service unsuccessful

SWS lookup

Orchestrator
Conclusion and Future Work

• An experimental QoS aware semantically enabled service environment with:
  – SAM service advertisement distribution in dynamic networks
  – LiQ service discovery, selection and orchestration using semantic technology
  – Both aimed at non-register solutions

• Future work encompass
  – defining a further concepts in our QoS ontology
  – implementation of the QoS algorithm
  – further work on different degrees of matching