Experiments with Web Services at Combined Endeavor 2009

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Combined Endeavor is an annual multi-national event featuring NATO and Partnership for Peace nations.
This presentation focuses on Web services and interoperability between fixed and mobile networks

Mobile users collect information.

The deployed HQ gathers information.

Result: A common operational picture.
Mobile users use heterogeneous communications equipment.

Mobile users take an active part in a mission, reporting events back to the HQ.
HQ gathers information and shares it with other oyed networks.

Q has fixed infrastructure, and yays to the mobile users.

Interoperability across networks is ensured using back-to-back IP radios.

Web services provide application level interoperability.
NC3A – Norway network interconnections and information sharing

"Static" Network

Mobile Ad Hoc Network

Deployed HQ Staff

Incident Reporting
Track and Incident Review

Incident Responder
Photo/Video Services
Mobile users report incidents back to the HQ.

The HQ is able to gather and visualize this information.

Thanks to network and application interoperability, we can create a common operational picture.
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
Centralized solutions are usually more “chatty” than distributed solutions: Need to optimize data rate requirements!

- Piggybacking
- Data compression
- Caching & timeouts
Service discovery in different networks requires different solutions.

<table>
<thead>
<tr>
<th>Work type</th>
<th>Discovery technology</th>
<th>NC3A mechanisms at CE</th>
<th>NOR mechanisms at CE</th>
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<tbody>
<tr>
<td>Local deployed work (HQ)</td>
<td>Federated registry</td>
<td>NATO Metadata Registry and Repository (NMRR)</td>
<td>The ebXML reference implementation, aka &quot;Omar&quot;</td>
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<tr>
<td>Local mobile work</td>
<td>Ad hoc discovery</td>
<td>Experimental mechanism: &quot;SAM&quot;</td>
<td>Experimental mechanism: &quot;SOP&quot;</td>
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DSProxy provides disruption tolerance, assuring that once you have discovered a Web service, it can be invoked.
Screenshot from the Norwegian HQ
Summary, we were able to interconnect mobile users deployed HQs using Web services for interoperability.