

Reducing Network Load through Intelligent Content Filtering

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Why content filtering?

- Bandwidth restrictions
 - there is not enough resources to transmit all information that is available
- Content filtering should be done based on *relevance*
 - transmit enough information to make the right decisions at the right time
 - which data is relevant will vary for each application, data source and end user
- Information overflow
 - receiving more information than one can process
 - can lead to users overlooking critical information



Types of content filtering

- Filtering metrics
 - Geographical filtering
 - Frequency based filtering
 - Priority based filtering
 - Role based filtering
 - Security label filtering
- Filtering types
 - Entire messages, or
 - Parts of messages.



Filtering challenges

- How to specify relevance?
 - Profile/role based
 - Format?
- Who determines what gets filtered?
 - End-user?
 - Predefined based on role?
- Filtering awareness
 - Does a user need to know when data gets filtered?
- How much do we filter?
- Where do we filter?

Where to filter?

- Filtering in the end-system terminals
 - Low complexity
 - Stateless
 - High bandwidth use
- Filtering in proxies/intermediate nodes
 - High complexity
 - Proxy may need to keep state
 - Reduces bandwidth use in parts of the network
- Filtering in message producing system
 - Medium complexity
 - May need to keep state
 - Best bandwidth utilization since no unnecessary information is injected into the network



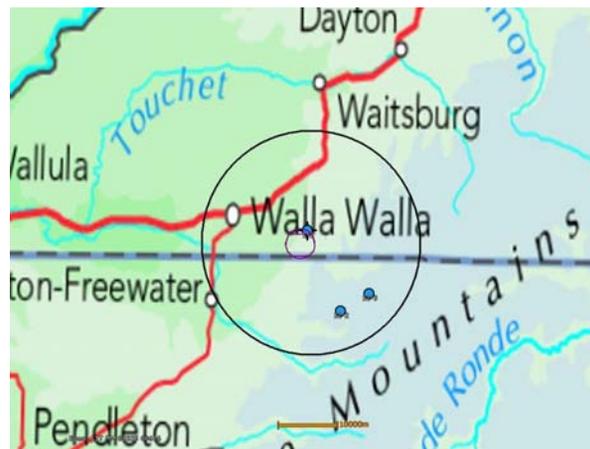
Experiments

- Performed at NATO CWID 2007
- Web service traffic
 - SOA enabling of a tactical handheld system
- NFFI formatted data
- Content filtering performed by a proxy/intermediate node
- Two types of filtering performed
 - Geographical
 - Optional field filtering

Geographical filtering

Fixed zone filter

Tracks within the zone are always sent, while tracks outside the zone are never sent.



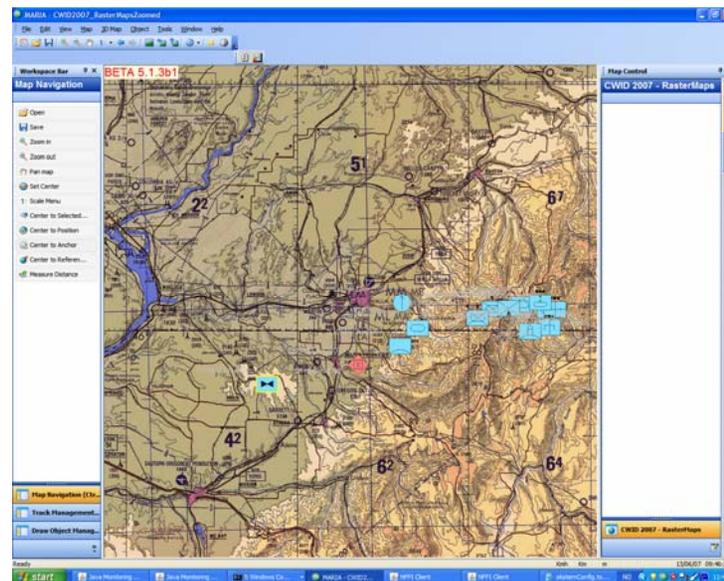
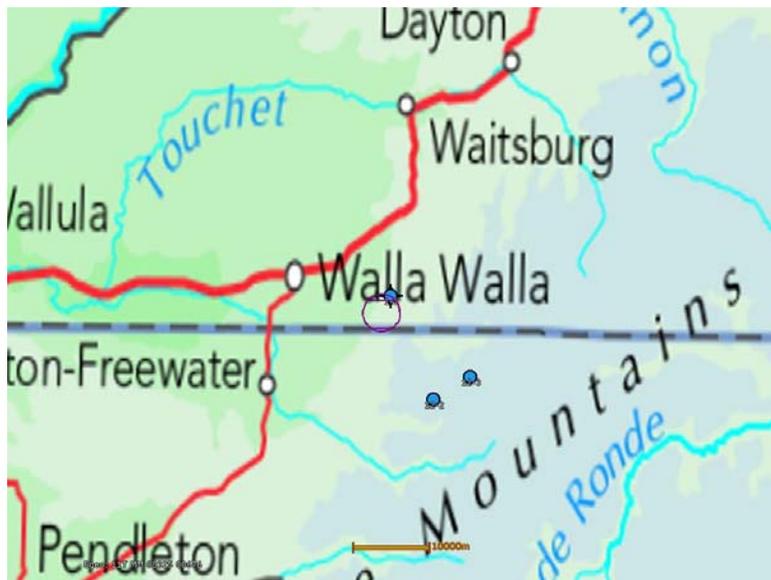
Zone ring filter

Track sending frequency is determined by the zone ring the track is in; tracks close to the unit is updated most frequent.



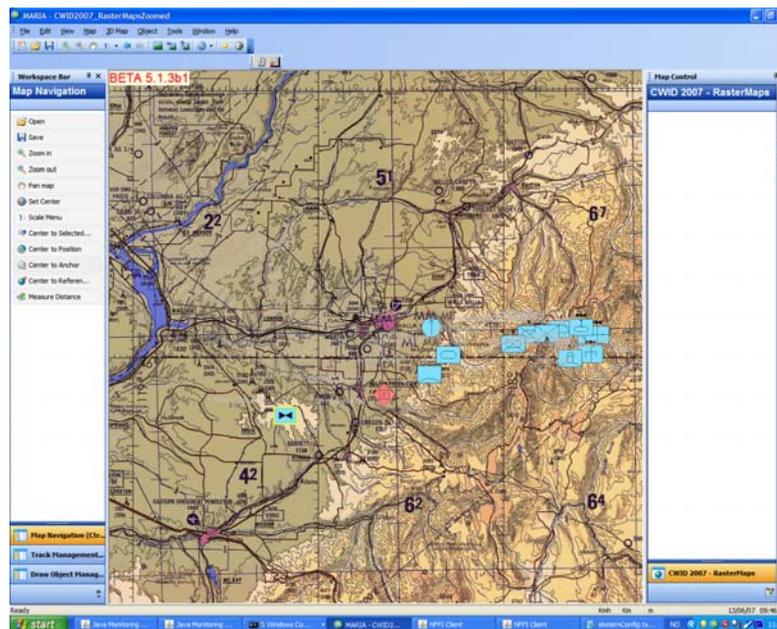
Fixed Zone Filter

Tactical unit display



Zone Ring Filter

Tactical unit display



Summary

- Content filtering is one of several measures that can be employed in order to increase the information infrastructures ability to adapt to changing network and battlefield conditions
- Experiments from NATO CWID 2007:
 - Proof-of-concept
 - Successful test of a combined geographical and frequency based filter
- Content filtering can:
 - Reduce network load
 - Help alleviate the information overflow issue
- Filtering can be complex
 - Filters must be adapted to fit the type of information and the need of the users